RESEARCH REPORT
STUDY PAPER 216
OCTOBER 2024

Offshoring and the Decline of Unions

Jakob R. Munch and William W. Olney

THE ROCKWOOL FOUNDATION
RESEARCH

STUDY PAPER 216 OCTOBER 2024

Offshoring and the Decline of Unions

Published by:

Address:
The ROCKWOOL Foundation Research Unit
Ny Kongensgade 6
1472 Copenhagen, Denmark

Telephone +45 33 34 48 00
E-mail: kontakt@rff.dk
en.rockwoolfonden.dk/research/

October 2024

Offshoring and the Decline of Unions*

Jakob R. Munch William W. Olney

June 2024

Abstract

The prevalence of labor unions have declined post-WWII, and this paper examines whether globalization is a contributing factor. Offshoring jobs abroad may change the composition of domestic firms and employment and thus reduce union density. Alternatively, a firms' ability to offshore may erode the union's bargaining power, decrease the benefits of union membership, and thus reduce unionization rates. We test these predictions using an employer-employee matched data set covering the universe of workers and firms in Denmark (1999-2017), which allows us to measure the exogenous threat of offshoring at the firm-level and the unionization decisions of individual workers. The findings show that the threat of offshoring reduces unionization rates, even within a job-spell. This is not driven by the changing composition of firms or workers, but instead appears to be due to a decline in the union's bargaining position. Additional results confirm that the union wage premium and the rent-sharing elasticity are both smaller at offshoring firms. These results have important policy implications for the distributional effects of globalization and for the future of organized labor.

Keywords: Offshoring, Unions, Trade, Globalization, Collective Bargaining

JEL Classification: F66, F16, J50

*Munch: University of Copenhagen and IZA, jakob.roland.munch@econ.ku.dk. Olney: Williams College, wwo1@williams.edu. Special thanks to Jaerim Choi for early work on this project and Mitch Downey for detailed comments and suggestions. We also thank Teresa Fort, Allan Lyngsø Madsen, and Vladimir Tyazhelnikov, as well seminar participants at the Empirical Investigations in International Trade Conference (EIIT), CESifo Global Economy Conference, Rockwool Foundation, European Association of Labour Economists Conference, University of Copenhagen, Williams College, Canadian Economics Association Conference, Midwest International Trade Conference, Mitre, and Australasian Trade Workshop. Thanks to Laura Shkoza for excellent research assistance. Financial support from the Rockwool Foundation is gratefully acknowledged.

1 Introduction

Labor unions negotiate on behalf of workers for increased compensation, better working conditions, improved benefits, and they can help resolve workplace disputes. However, one of the most striking labor market features post-WWII, has been the steady decline in unionization rates (Farber et al., 2021; Bhuller et al., 2022). Specifically, the share of unionized workers in OECD countries has fallen 22 percentage points over the last half century (from 38% in 1970 to 16% 2019), and declined in the U.S by 18 percentage points.[1] While these trends have been well-documented, there is less consensus on the cause of this decline, with possible explanations including sectoral reallocation, skill-biased technical change, and institutional factors (Acemoglu et al., 2001; Hirsch, 2008). This paper proposes and examines a different explanation, namely that an increasingly integrated global economy has contributed to the decline of labor unions. The timing is plausible, with the fall in the unionization rate coinciding with a 39 percentage point increase in OECD trade as a share of Gross Domestic Product over the last fifty years.

We are particularly interested in offshoring, or the relocation of domestic jobs abroad. Offshoring provides firms an appealing outside labor option, which has cost-saving and productivity-enhancing effects. This can affect unionization rates in two ways. First, the relocation of jobs abroad can alter the composition of domestic industries, firms, or workers, which may reduce unionization rates. For example, offshoring could lead to a decline in heavily unionized industries or lead to unionized jobs within a firm being relocated abroad. Second, firms' ability to threaten offshoring may erode the bargaining position of the labor union in negotiations with the firm (Rodrik, 1997; Mezzetti and Dinopoulos, 1991; Eckel and Egger, 2009). A less generous collective bargaining agreement for domestic employees, will reduce workers' incentives to be a union member.[2] Consistent with these two hypothesis, workers typically say they left the union due to a change in their employment situation or because they were dissatisfied with the union (Jodar et al., 2011; Waddington, 2006). This paper will examine whether offshoring reduces unionization rates and if so whether this is due to a compositional or bargaining effect.

The relationship between offshoring and unionization rates is examined within the context of Denmark, which is appealing for a few reasons. Denmark has a relatively flexible labor market that is conducive for studying the effects of globalization on union density. It has also traditionally been heavily unionized but consistent with broader global trends, unionization rates have steadily fallen over the last two decades. Denmark

[1] Trade Union Density data is available at stats.oecd.org

[2] Alternatively, concerns about future offshoring could increase union membership if workers' think the union will protect them from displacement, although this inconsistent with the decline in union density observed in many countries.

is highly integrated into global markets, trade has increased quickly, and offshoring in particular is becoming more common.[3] A more practical benefit is that Denmark has a detailed employer-employee matched data set, which covers the universe of firms and the entire population of workers from 1999-2017. This data is particularly well-suited for our analysis because it contains union membership information at the individual *worker-level*, which is a significant improvement over more aggregate industry or occupation measures that are common in the literature. Furthermore, detailed employer information allows us to measure exogenous changes in offshoring at the *firm-level*, which is more precise than the typical industry-level offshoring measures. These features of the data enable us to study the relationship between offshoring and unions much more carefully than has previously been possible and they provide an opportunity to disentangle the compositional and bargaining explanations.

Our analysis begins with a decomposition exercise (Melitz and Polanec, 2015) that finds that between-firm changes, firm entry, and firm exit explain only a small share of the overall decline in the unionization rate. This suggests that changes in the sectoral composition of the economy (i.e. declines in heavily unionized firms and industries) is not driving the reduction in the overall union density. Instead, the far more important factor is within-firm changes in the unionization rate. Given this result, we focus on a factor (i.e. offshoring) that could cause firms to become less unionized over time.

We follow the now standard approach of measuring offshoring by identifying imported products that the firm could produce themselves (Feenstra and Hanson, 1999; Hummels et al., 2014).[4] Using detailed import data to measure offshoring allows us to capture offshoring to both foreign affiliates and foreign arms-length suppliers, which is not possible when measuring offshoring using Foreign Direct Investment (FDI) data. While our measure focuses on offshoring whose output is sold back to Denmark, evidence shows that this import-based measures of offshoring is similar to FDI-based and survey-based measures (Bernard et al., 2020; Olney and Pozzoli, 2021). To address concerns that offshoring decisions could respond endogenously to unobserved firm characteristics, we identify exogenous variation in the firm's ability to threaten offshoring. Specifically, the threat of offshoring is measured using exogenous growth in foreign suppliers which disproportionately affects Danish firms that sourced this product from this foreign country in the presample year. We use this offshoring threat measure in a two-stage least squares (2SLS) estimation approach and also in a reduced-form specification, with the idea that what may matter for firm-union negotiations is whether the firm can credibly

[3]For instance, Danish trade as a share of GDP rose from 72% in 1999 to 104% in 2017, and the threat of offshoring has increased 80% over this period.

[4]These are products that are within the same HS4 industry classification as firm production or exports.

threaten offshoring and not weather the jobs are actually relocated abroad.

Our first set of results show that offshoring reduces unionization rates within the firm, after controlling for a wide variety of firm, industry, and regional factors. Specifically, the instrumental variable and reduced-form specifications both show that the offshoring leads to a decline in the union density at the firm. The inclusion of a rigorous set of fixed effects ensures that these results are not driven by offshoring altering the composition of firms or industries, but rather it is leading to within-firm changes in the unionization rate. Our estimates indicate that offshoring can explain about a quarter of the within-firm decline in the unionization rate over the last two decades.[5]

Another possibility is that offshoring may alter the composition of workers within the firm.[6] To account for this, we exploit the appealing features of our data and turn to a worker-level empirical specification that controls for job-spell fixed effects. This approach tests whether, within a worker-firm match, exogenous changes in the firm's ability to threaten offshoring influences workers' decision to be part of the union. This controls for the changing composition of workers, by only focusing on the union decisions of employees that continue to work for the same firm over time. While these results are smaller in magnitude than the firm-level findings, which indicates that compositional effects do play some role, importantly we find that offshoring reduces the likelihood that a worker is a union member even within a job-spell. To address the possibility that workers could respond to offshoring by switching from a high- to low-unionized occupation within the firm, we include firm*worker*occupation job-spell fixed effects, and still find a significant negative relationship between offshoring and union membership. Additional findings confirm that the results are stronger in occupations that are more offshorable and at firms with more flexible wage bargaining systems (Autor et al., 2013; Dahl et al., 2013).

Together these findings provide compelling evidence that offshoring is reducing unionization rates. This relationship is not driven by compositional changes in industries, firms, or even workers, which leaves declines in the union's bargaining power as a remaining viable explanation. The idea is that if the union's bargaining position deteriorates due to offshoring, the wage benefits of being a union member will be eroded, and thus the incentive for workers to join or remain in the union declines. Specifically, if the union wage premium falls relative to union dues, workers on the margin may choose not to be part of the union.[7] As additional tests of

[5] See the back of the envelope calculation in Section 3.3

[6] For instance, offshoring may change the types of tasks still performed at the firm, or broader demographic changes (i.e. more immigrants) may alter the likelihood that workers join the union and incentives for firms to offshore (Olney and Pozzoli, 2021).

[7] We focus on the wage benefits of union membership, which are often quite salient for workers and relatively easy to measure, but of course there are other potential benefits of joining the labor union, including improved working conditions, non-wage benefits, and assistance with workplace disputes.

this bargaining power explanation, we use insights from the standard bargaining model (Abowd and Lemieux, 1993) to guide two different empirical approaches.

A Mincerian earnings equation is used to confirm that union workers do in fact receive a higher wage than non-union workers, even within a job-spell.[8] The magnitude of this union wage premium is similar to existing findings (Hummels et al., 2014; Breda, 2015) and we document that this premium is shrinking over time, which is consistent with the rising threat of offshoring over our sample period. Our regression results show that the union-wage premium is significantly smaller at firms that can credibly threaten to offshore jobs. This indicates that offshoring erodes the bargaining power of the union and thus reduces the wage-benefits of union membership, which is consistent with theoretical predictions from Mezzetti and Dinopoulos (1991) and Eckel and Egger (2009).

We complement this analysis with a rent-sharing empirical specification (Card et al., 2018; Kroft et al., 2020; Lamadon et al., 2022). Our methodological contributions consistent of including job-spell fixed effects, which addresses concerns that workers select into firms with larger rents, and using a world import demand (WID) instrument to more carefully identify an exogenous source of variation in firm rents. The results show that at non-offshoring firms, union workers disproportionately benefit from firm rents compared to non-union workers. However, at firms that can threaten offshoring, the share of firm rents captured by union workers is significantly smaller and close to zero, which is consistent with unions having a less favorable bargaining position. Overall, both the union-wage premium results and the rent-sharing results, provide additional confirmation that offshoring is reducing unionization rates by decreasing the bargaining power of the union and thus the benefits of union membership.

This paper contributes to the existing literature in a few ways. First, our paper highlights a new distributional implication of globalization. It has been well documented that globalization can adversely effect labor market outcomes of less-skilled workers (Autor and Dorn, 2013; Hummels et al., 2014; Pierce and Schott, 2016). Labor unions have traditionally been important advocates for these workers (Farber et al., 2021), and their presence may mitigate some of the negative labor market consequences of globalization. However, our findings show that workers are not only adversely affected by globalization directly, but they are also simultaneously losing the organizations that typically negotiate on their behalf.

Second, we relate to a growing body of research investigating the labor market impacts of offshoring. Previous papers study the effect of offshoring on the skill premium (Feenstra and Hanson, 1999); the effect

[8] While non-union workers are sometimes covered by the bargaining agreement, particularly at the sector-level, this union wage premium confirms that there are pecuniary benefits of joining the union in Denmark (see Section 2.1).

of offshoring on employment (Kovak et al., 2021); whether offshoring generates a positive productivity effect (Olney, 2012; Ottaviano et al., 2013); and the wage impacts of offshoring (Ebenstein et al., 2014; Hummels et al., 2014). Unlike this existing work that typically focuses on offshoring-induced wage effects, in this paper we are interested in the impact of offshoring on unionization rates. Given the rapid decline of labor unions in most developed countries, this is an important and policy-relevant question.

Third, our paper contributes to existing research studying the link between trade and union density (Slaughter, 2007; Felbermayr et al., 2014; Baumgarten and Lehwald, 2019). Two recent papers examine the impact of Chinese import competition on labor unions in the U.S.[9] Specifically, Ahlquist and Downey (2023) find that unionization rates increase in affected areas due to compositional changes as workers leave import-competing sectors and enter more highly-unionized sectors. On the other hand, Charles et al. (2023) find that union organizing decline in affected areas, due in part to smaller wage gains associated with union membership. These studies rely on industry-level variation in trade and state- and CZ-level measures of union density, while we use our employer-employee matched data set to examine how exogenous firm-level offshoring affects union decisions of individual employees. We focus on offshoring, rather than trade or import competition, because it can directly affect union negotiations by providing firms an outside labor option. Papers that share our focus (Kramarz, 2008; Lommerud et al., 2009) typically examine the effect going in the other direction (i.e. unions impact on offshoring) and the conflicting results point to the need to carefully address causality. An added benefit of our data and empirical approach is that we can disentangle compositional changes from bargaining power, which to the best of our knowledge has not previously been possible in a unified analysis and may help reconcile findings in this literature.[10] Finally, our results relate to Stansbury and Summers (2020), who argue that declining union bargaining power is leading to major structural changes, and we show that offshoring is contributing to this decrease.

The paper proceeds as follows. In the next section, we discuss the Danish institutional setting and our data. Section 3 shows that the threat of offshoring reduces the unionization rate using both a firm-level and worker-level analysis. We confirm in Section 4 that the union-wage premium and the rent-sharing elasticity are both lower at offshoring firms, which is consistent with declines in the bargaining power of the union. Finally, Section 5 provides some concluding thoughts.

[9] Relatedly, unions can mitigate the negative impact of import competition on employment (Cristea and Lopresti, 2024) and exacerbate the impact of trade liberalization on election outcomes (Ogeda et al., 2024).

[10] See Blanchflower and Bryson (2024) for a discussion of why separating these effects is challenging.

2 Background and Data

This section outlines the relevant institutional features of the Danish labor market, discusses the main data sources used in this analysis, describes how our key unionization and offshoring measures are constructed, and presents some descriptive evidence.

2.1 Danish Setting

There are a number of institutional features of the Denmark that make this an appealing setting to study the relationship between offshoring and unionization rates. First, unlike many other European countries that have relatively rigid labor markets, Denmark has one of the most flexible labor markets in the world which is on par with the United States (Botero et al., 2004). Known as 'flexicurity" the Danish labor market model consists of flexible hiring and firing rules, a generous social safety net, and job-search and job-training incentives (Humlum and Munch, 2019; Kreiner and Svarer, 2022). The flexibility of the Danish labor market is appealing for an analysis, like ours, that examines how labor markets adjust to globalization.

Second, unions have traditionally played an important role in the Danish economy. For instance, Denmark does not have a legal minimum wage and instead basic wage levels are set via negotiations between trade union confederations and employer organizations at the sector level.[11] Final wage setting negotiations typically occur in three different ways; i) at the sector level, ii) in a two-tiered system, where in addition to the sectoral wage-floors subsequent negotiations over salary supplements occur at the firm level, or iii) exclusively at the firm level (Dahl et al., 2013; Card and Cardoso, 2022). In the 1990s there was a shift towards more decentralized firm-level negotiations, with two-tiered bargaining and firm-level bargaining covering most of the private labor market, and this bargaining structure has remained relatively stable since. While interesting, this decentralization of bargaining predates our sample period. In our analysis, 15 percent of workers have wages negotiated at the sector-level, 48 percent in a two-tiered wage-setting system, and 37 percent at the firm-level.[12] Unions also negotiate with employer organizations over leave policies, pensions, working hours, unemployment benefits, holidays, professional development, and conflict resolution, with the government playing a passive role in this process. However, unions and employer organizations do collaborate with the government in "triparty agreements" that set labor market policies (Kreiner and Svarer, 2022).

[11] For example, the Danish Trade Union Confederation (FH) bargains with the Confederation of Danish Employers (DA) in this first round of negotiations.

[12] The Danish labor market is divided into bargaining segments which are defined at the occupation and industry level. After 1999 no bargaining segments changed wage-setting systems in the manufacturing sector, but the number of workers covered by firm-level bargaining has risen slightly due to the changing composition of occupations and industries. Results in Section 3.5 examine the sensitivity of our findings to these different wage setting systems.

Third, the unionization rate in Denmark is relatively high at 66% overall, compared to 10% in the U.S. (Kreiner and Svarer, 2022), and is even higher (81%) in our sample of Danish manufacturing firms. This high Danish union density is noteworthy since membership is voluntary and non-union members are sometimes covered by the collective bargaining agreement. In the U.S., 'right-to-work' laws, where workers can enjoy union benefits without being required to be members and pay dues, are negatively related with unionization rates (Murphy, 2023). However, free riding is typically found to be less of an issue in the European context, perhaps due to reputational concerns and other potentially excludable benefits (Murphy, 2020).[13] Furthermore, while non-union-members may be covered by the collectively bargained wage floor at the sector-level, the local union representatives often negotiate on behalf of just union members in the two-tiered or firm-level wage discussions. Consistent with this, we find that there is a positive and significant Danish union-wage premium, similar in magnitude to Hummels et al. (2014), which indicates that there are pecuniary benefits of joining the labor union despite potential non-membership coverage.[14] The high level of union membership (and membership in the employer organizations) is a key factor in the success of the Danish collective bargaining system, because without it the trade unions would lack funding and legitimacy.[15]

Fourth, although the union density level is relatively high, Danish unionization rates have steadily declined over the last two decades (see Section 2.5). This is consistent with declines in most other developed countries (Bhuller et al., 2022), and points to a common determinant, like globalization, rather than an explanation specific to Denmark.[16] While these declines have been well-documented, there is less consensus on the cause. Survey data from Spain and Britain offer clues about why workers leave the union (Jodar et al., 2011; Waddington, 2006). About one third of respondents left because they are dissatisfied with the union (i.e. unhappy with union benefits), while slightly more than half left because of changes in their employment situation (i.e. retirement, changed jobs, laid off). Offshoring may be a driver of both factors, given that it can lead to job displacement and it can influence union bargaining and benefits. The detailed nature of our data allow us to disentangle these competing explanations in a unified framework, which to the best of our knowledge has not previously been possible.

Finally, Denmark is highly integrated into global markets, and trade has increased quickly over the last two

[13] Labor unions try to restrict benefits to union members only. For example, unions requested in 2007 that retraining funds be available for union members only, but the employers opposed this and it did not become part of the final agreement.

[14] To the extent that non-union members also receive the higher collective-bargained wage, this should attenuate our union wage premium results.

[15] See "The Labour Market in Denmark" https://bm.dk/media/19251/the-labour-market-in-denmark.pdf

[16] For example, Denmark changed the maximum annual tax deduction for union membership fees in 2010 and the tax value of the deduction has been reduced. In addition, new "yellow unions" have emerged which have lower membership fees and can offer non-pecuniary benefits, such as legal advice, but they do not have the same bargaining rights as traditional unions.

decades. Danish trade as a share of Gross Domestic Product (GDP) rose from 72% in 1999 to 104% in 2017, and Danish offshoring in particular has increased over this period too, as we will document. Ultimately, these features of the Danish economy, including flexible labor markets, declining union densities, and increasing global integration, offer a unique opportunity to study the relationship between offshoring and the unionization rate.

2.2 Data Sources

Our analysis combines information from a variety of different Statistics Denmark data sources. Data on the universe of private sector firms comes from the Firm Statistics Register (henceforth FirmStat) and the Account Statistics Register (FIRE) and is available from 1999-2017. Trade data comes from the Foreign Trade Statistics Register for the years 1999-2017. This dataset has firm-level export and import data by foreign country and product (at the 8-digit Combined Nomenclature) and is linked to FirmStat using a unique firm identifier. The ability to measure *firm-level* imports and exports at the detailed product level is unusual and especially appealing for this analysis.

Data on the population of Danish workers comes from the Integrated Database for Labor Market Research (IDA) for the years 1999-2017, which we merge with the Income Register (INDK) and the Wage Statistics Register (LON). This combined worker-level data set has information on the hourly wage of workers as reported by employers and covers workers in firms with at least 10 employees. Importantly for us, it also has information on whether an *individual* worker is a member of the labor union. This is identified using information on workers union membership fees, which are deducted on the worker's tax return. In addition, we can measure worker characteristics, such as age, gender, labor market experience, education, immigrant status, and occupation.[17]

Every worker in the IDA dataset is linked to every firm in FirmStat using a unique identifier provided by the Firm-Integrated Database for Labor Market Research (a.k.a. FIDA). This generates an employer-employee matched data set that allows us to measure offshoring, and the threat of offshoring, at the firm level and examine how this affects union decisions of individual employees at these firm. The specific union and offshoring measures are described in more detail in the next two sub-sections.

[17] High-skilled workers are defined as those with a tertiary degree, occupations are defined at the four-digit ISCO level, and we measure both experience and experience squared.

2.3 Union Membership

Studies of labor unions face the perpetual data challenge that union membership information is seldom available at the firm or local level (Cristea and Lopresti, 2024). Thus, existing work often measures union membership at the industry, state, or commuting-zone level (Hirsch and Macpherson, 2003; Ahlquist and Downey, 2023; Charles et al., 2023). Instead, we are able to construct a binary variable indicating whether each worker is a member of the labor union. The ability to identify union membership at the individual-level and link these workers to their employers is unusual and an appealing feature of this data set.

Our analysis begins with a firm-level analysis, where we average of our binary worker-level measure of union membership. Appendix Figure A.1 shows the distribution of unionization rates at the firm-year level in our sample of manufacturing employers. We see that the mean union density is relatively high and there is some bunching around zero, fifty, and one hundred percent. There is also a fairly continuous distribution of unionization rates, which is important for our analysis. If instead there was a bimodal distribution, where firms were either entirely unionized or not unionized at all, it would be more challenging for us to identify the effect of offshoring on firm-level unionization rates.

There are also significant changes in the union density within firms over time. In fact, the majority of the decline in the overall unionization rate in Denmark is due to *within-firm* changes over time (which we document in section 3.1). Consistent with this, workers frequently change their union membership status over time, even within an employer-employee match. For example, we show in Appendix Table A1 that within job-spells lasting at least two years, 6.5 percent of workers join the union and 6.2 percent of workers leave the union. We also see that, not surprisingly, the switching rate is lower for short job-spells and higher for long job-spells. Membership switching that occurs within job-spells is particularly interesting because it is not due to the changing composition of industries, firms, or workers. These within-firm, and even within-job-spell, changes in union membership highlight the importance of carefully measuring union decisions at the firm and individual-level, which typically has not been possible.

2.4 Offshoring

We measure offshoring using detailed import data in the now standard approach first proposed by Feenstra and Hanson (1999) at the industry level and applied to the firm-level in Hummels et al. (2014). The idea is to measure offshoring by identifying imported products that the firm could have produced themselves. Specifically, offshoring is defined as follows:

$$Off_{jt} = \sum_{ck}^{\Omega_j} m_{jckt}, \tag{1}$$

where m_{jckt} are firms j's imports of product k, from origin country c, in year t. Ω_j is firm j's set of imports that it could potentially produce itself, which is defined as products within the same HS4 classification as firm production or exports.[18] Firm imports that are outside the Ω_j set are products that are quite different from firm production (i.e. oil) and are thus not consistent with standard definitions of offshoring and are omitted form our measure. Finally, we sum across countries c and products k to get our offshoring measure at the firm-year level.

This offshoring variable is an improvement over industry-level measures common in the literature because offshoring tends to be highly firm-specific (Hummels et al., 2014, 2018), which we document in Appendix Table A2. Using detailed firm by product by country by year import data to measure offshoring is appealing, especially because it captures offshoring to foreign affiliates and foreign arms-length suppliers (which FDI-based measures of offshoring miss). While our measure does not include offshoring whose output is sold to other foreign countries, survey data shows that 95% of Danish firms that offshore to a particular area also import from that area (Bernard et al., 2020). Furthermore, existing studies have shown that similar results are obtained when using this import-based measure of offshoring or an FDI-based measure of offshoring (Olney and Pozzoli, 2021).

The decision to offshore may be endogenous to unobserved firm-level characteristics. Thus, to identify the causal effect of offshoring on unionization rates, we focus on exogenous variation in offshoring due to changing conditions in the trading partner country. Specifically, we construct an offshoring threat variable using presample firm import shares and exogenous growth in exports in the foreign trading partner country in the following way:

$$OffThreat_{jt} = \sum_{ck}^{\Omega_j} s_{jckt_0} X_{ckt}, \tag{2}$$

where s_{jckt_0} is firm j's share of total imports that are of product k from foreign country c, in the presample year of t_0. Note that $\sum_{kc}^{\Omega_j} s_{jckt_0} = 1$ and the presample year is 1999 or the first year a new firm enters the dataset. For each firm, we focus on the set of products (Ω_j) that they could produce themselves. Using bilateral trade data from COMTRADE, we measure X_{ckt} as country c's total exports of product k to the rest of the world

[18] These HS4 products are ones that the firm produced or exported at some point over the sample period.

(not including Denmark) in year t. We then take the product of these two terms and sum across countries and products to identify the threat of offshoring for firm j in year t. The idea is that shocks in the foreign country c are plausibly exogenous to economic conditions in Denmark. We then identify how this disproportionately affects some Danish firms more than others based on their sourcing decisions in the presample year. For example, if country c becomes relatively better at producing product k, the threat of offshoring rises for those Danish firms that imported this product from this country in the presample period.

It is possible that this offshoring measure is driven not only by exogenous supply shocks of product k in country c but also by global demand shocks for product k, which in turn could be correlated with unionization rates in Denmark. However, Denmark is a relatively small country, whose domestic conditions are unlikely to influence global demand for product k. In addition, our offshoring threat measure purposely excludes any exports of product k to Denmark to address this concern. We also include industry*year fixed effects in our estimating equation to account for potentially problematic time-varying global demand shocks or skilled-biased technical change. Another potential concern is that the firm's presample import shares could be correlated with unobserved firm characteristics that could influence unionization rates. For instance, suppose high-tech firms import more of product k from abroad and given the nature of their production process they are also hire fewer union workers. To address this possibility, we use the firms' *pre-sample* import shares to eliminate potentially endogenous changes in firm imports. Furthermore, the inclusion of job-spell fixed effects in our subsequent analysis, identifies changes in offshoring and unionization rates within a firm-employee relationship. Any time-invariant differences across firms in terms of their technology, production processes, or sourcing decisions will be controlled for by these fixed effects.

Our offshoring threat measure is analogous to the World Export Supply (WES) instrument used by Hummels et al. (2014) and similar in spirit to a shift-share Bartik instrument. Recent research shows that the validity of the shift-share identification strategy rests on the exogeneity of the shares (Goldsmith-Pinkham et al., 2020) or the 'shocks' being randomly assigned (Borusyak et al., 2022). Our empirical approach differs from the standard shift-share approach in a couple of important ways, which means both conditions are likely satisfied. First, the standard Bartik approach uses shares to identify differential exposure to a *common* shock (i.e. national industry-level Chinese imports) and thus in this setting the exogeneity of the shares is quite important (Goldsmith-Pinkham et al., 2020). However, in our context the shocks are not common at all, and in fact they are highly firm-specific, which improves instrument relevance (Borusyak et al., 2022). For instance, Appendix Table A2 shows that firm imports are concentrated in just a few origin-product goods, firms import different

origin-products from each other, and often firm j is the only firm importing product k from country c (the median number of firms importing product ck is one in Table A2).

Second, the identifying assumptions are unlikely to be satisfied in a shift-share specifications that relies on a relatively small set of industry-level shocks, that are potentially correlated (Borusyak et al., 2022). In contrast, our analysis uses variation in approximately 12,000 unique origin-product goods (see Appendix Table A2) and thus the shocks we are exploiting are likely to be as-good-as-randomly assigned from the perspective of the Danish firm. Denmark is a relatively small country that is unlikely to significantly influence economic conditions in trading partner countries (Hummels et al., 2014) and individual firms are even less likely to influence foreign trade flows. As discussed, we also exclude exports of product k from country c that are shipped to Denmark and we include industry*year fixed effects in all of our empirical specifications to account for productivity and technological changes.

It is also possible that firms' presample shares become less relevant over time, especially if the firm is in the sample for many years or if the extensive margin of offshoring is important. However, in our sample two thirds of the firms (i.e. 66%) do not last the full sample period and thus there is less time for their presample shares to become obsolete. Furthermore, among the firms that are in our sample for the full period, the vast majority of them continue to offshore the same products to the same countries. Specifically, 65% of firm-product-country goods that are offshored in 1999 are also offshored in 2017. Even if the extensive margin of offshoring was important and firms were offshoring new products to new countries over time, this would if anything make our offshoring threat measure less precise and would attenuate our findings. We show (Figure 2) that our offshoring threat measure is useful at predicting actual offshoring, which indicates that the intensive margin of adjustment is important. Finally, results are similar when the presample shares are calculated in the year prior to the start of the job-spell rather than in the firms' presample year (see Section 3.4).

The variation in our offshoring measure, across both countries and industries, is plausible and consistent with existing evidence. We find that a large fraction of Danish offshoring goes to Germany (21%), Norway (12%), Sweden (9%), the U.K. (6%), and the Netherlands (5%) (Leisner et al., 2023). There is also substantial heterogeneity in the threat of offshoring across industries both in terms of levels and changes over time. For example, Appendix Table A3 shows that the three industries facing the highest threat of offshoring in 2017 are Computers, Motor Vehicles, and Electric Equipment. This is consistent with existing evidence in Olney and Pozzoli (2021), which finds that offshoring is common in these three industries. Perhaps more importantly this industry-level variation is also consistent with findings from Bernard et al. (2020) who use a completely

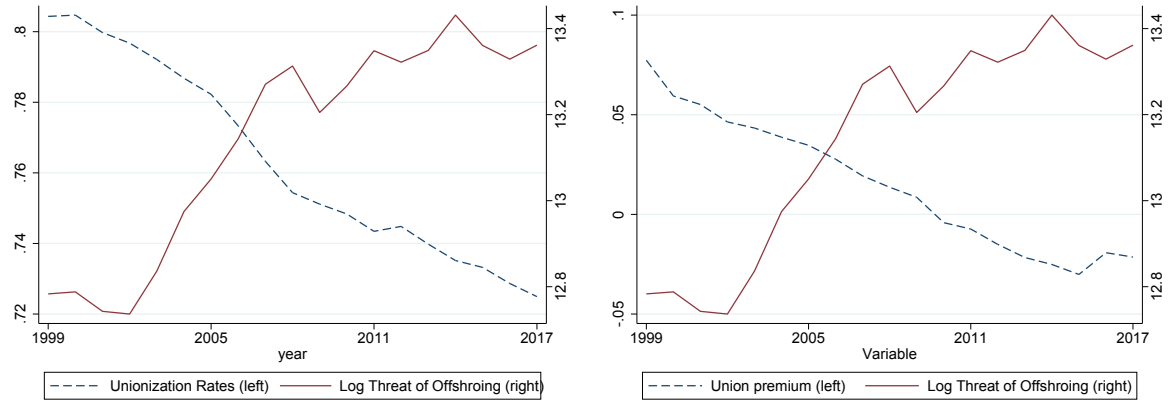
different survey-based measure to show that offshoring disproportionately occurs in these industries.[19]

2.5 Descriptive Statistics

Combining these data sources, generates a comprehensive employer-employee matched data set, which covers the universe of firms and the entire population of workers from 1999-2017. We follow the existing literature and focus on manufacturing firms with more than fifty employees (Hummels et al., 2014), because smaller firms tend to have imputed balance sheet information and missing trade data. Table A4 in the Appendix reports descriptive statistics of the key variables used in our firm- and worker-level analysis. The sample includes over 16,000 firm-year observations and over 3 million worker-firm-year observations. The data covers roughly 70 percent of total manufacturing sales, employment, and value added, as well as 85 percent of total offshoring in the manufacturing sector. Panel B of Table A4 reports the characteristics of union and non-union workers, and we see fairly similar wage, gender, age, experience, and education profiles.

Time-series variation in union density and offshoring is shown in Figure 1. In the left panel, we see that unionization rates have steadily declined in Denmark, which is consistent with trends in a variety of developed countries (Bhuller et al., 2022). Specifically, the unionization rate at manufacturing firms was 80.4% in 1999 but this declined by eight percentage points over the subsequent two decades and by 2017 the union density was 72.5%.[20] We also see in the left panel of Figure 1 that this decline in union density coincided with a relatively rapid rise in offshoring. Specifically, the threat of offshoring increased about 80% from the late 1990s to the mid-2010s.[21]

Figure 1: Offshoring, Union Density, and Union Wage Premium



Notes: The threat of offshoring and the unionization rate (left side) is calculated for all employees in the manufacturing sector. The union wage premium (right side) is obtained from regressing wages on a binary union membership variable interacted with year fixed effects and controlling for a variety of factors discussed in more detail in Section 4.2.

[19] Specifically, their "Machinery" industry accounts for half of all offshoring in Denmark.

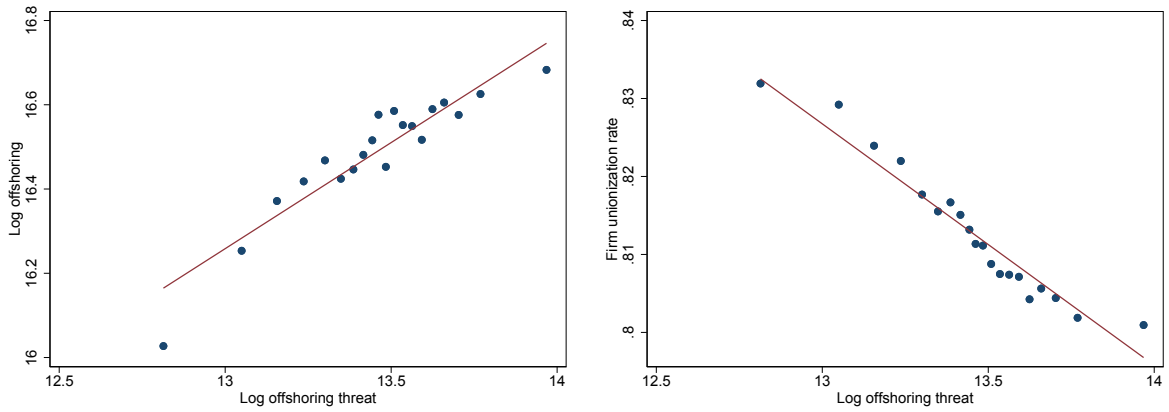
[20] The fall in the unionization rate is even more pronounced in our sample of large manufacturing firms, declining from about 86% to 77% over this period.

[21] The log threat of offshoring increases from about 12.8 in 1999 to 13.4 in 2017, which is equal to an 82% increase.

To the extent that these changes in offshoring and union density are related, we are interested in the possible mechanisms driving this relationship. One hypothesis is that the threat of offshoring undermines the union's bargaining power, erodes the benefits of union membership, and decreases the likelihood that workers are union members. The right panel of Figure 1 provides some descriptive evidence supporting this hypothesis. Using a Mincerian wage regression, we estimate the union wage premium and plot changes in this premium over time (see section 4.2 for details about this empirical specification). There has been a steady decline in the premium over our sample period, which is consistent with existing evidence (Bell et al., 2024; Blanchflower and Bryson, 2003).[22] For comparison purposes, we again report the change in the threat of offshoring over this period. Figure 1 shows that as the threat of offshoring rises the wage benefits of union membership decline, which is consistent with the erosion of the union's bargaining power. Overall this time-series descriptive evidence suggests that offshoring may be playing a role in the decline in unionization rates.

Figure 2 reports binned scatter plots showing the relationship between offshoring, the threat of offshoring, and the unionization rate, after accounting for firm fixed effects. On the left side, we find that offshoring and the threat of offshoring are positively related, which provides preliminary support for the first-stage of our 2SLS specification. The ability for the firm to credibly threaten offshoring may affect the union's bargaining power and thus we will also use the threat of offshoring in a reduced-form specification. The right side of Figure 2 investigates this possibility, by plotting the firm-level unionization rate directly against the threat of offshoring. A strong negative relationship is evident (consistent with Figure 1) which indicates that union density is decreasing with the threat of offshoring, even after accounting for firm fixed effects.

Figure 2: Offshoring, Offshoring Threat, and the Unionization Rate



Notes: The left side shows the binned scatter plot of log offshoring against the log threat of offshoring. The right side shows the binned scatter plot of the firm-level unionization rate against the log threat of offshoring. Sample includes large manufacturing firms and the scatter plots account for firm fixed effects.

[22]Note the negative union wage premium towards the end of the sample period is consistent with Frandsen (2021). The inclusion of a wide array of fixed effects in our union-wage premium specification means that the absolute levels of the coefficients are less meaningful than the trends over time.

3 Unionization Rate

This section begins by examining whether the aggregate decline in the unionization rate is explained by within or between firm changes. We then pursue both a firm- and worker-level analysis that tests whether offshoring contributes to the within-firm decline in the unionization rate in Denmark.

3.1 Decomposition

We are interested in whether offshoring reduces unionization rates. This offshoring-induced decline in unionization rates may be driven by the changing sectoral composition of the economy. For instance, offshoring could lead to a decline in the more heavily unionized industries and firms. Alternatively offshoring may undermine the bargaining position of the labor union, which would lead to within-firm declines in the unionization rate. Before incorporating offshoring into the analysis, this section simply examines whether the decline in the unionization rate is driven by between- or within-firm changes, which will provide initial insight into the relative importance of these competing explanations.

We rely on the Melitz and Polanec (2015) decomposition to examine the extent to which declines in the Danish unionization rate are explained by within-firm changes, between-firm changes, firm exit, and firm entry. The decomposition of the aggregate changes in unionization rates ($\Delta\Phi$)can be written as:

$$\Delta\Phi = \sum_{i\in S} s_{i1}(\varphi_{i2} - \varphi_{i1}) + \sum_{i\in S}(s_{i2} - s_{i1})\varphi_{i2} + \sum_{i\in E} s_{i2}\varphi_{i2} - \sum_{i\in X} s_{i1}\varphi_{i1} \tag{3}$$

where s_{it} is the share weight of firm i in year t and φ_{it} is the unionization rate at firm i in year t.[23] The first term captures within-firm changes occurring at surviving firms, the second term is between-firm changes at surviving firms, the third term is the changes due to firm entry, and the fourth term reflects changes due to firm exit.[24]

Figure 3 reports the findings from this decomposition exercise. The results show that between-firm changes, firm exit, and firm entry play a relatively small role in the decline in the aggregate union density. Specifically, between-firm changes and firm entry lead to declines of only 0.8 and 1.3 percentage points respectively, while firm exit actually increases the unionization rate by 0.9 percentage points.[25] In contrast, within-firm changes are by far the most important factor. Specifically, within-firm changes lead to a 6.7 percentage point decline in

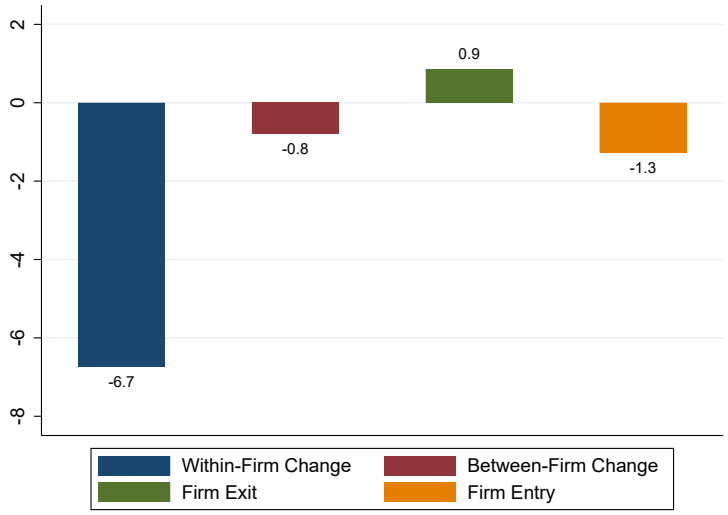
[23] Note that the shares $s_{it} \geq 0$ and sum to 1.

[24] S, E, and X denote the sets of surviving, entering, and exiting firms.

[25] This firm exit result is consistent with Ahlquist and Downey (2023) who argue that non-unionized firms are disproportionately affected by Chinese import competition.

the unionization rate, which explains 85 percent of the overall decline documented in Figure 1.[26]

Figure 3: Decomposing Changes in the Unionization Rate



Notes: This figure includes manufacturing firms, covers the years 1999 to 2017, and uses the Melitz and Polanec (2015) decomposition.

We conclude from this decomposition exercise that the observed decrease in the Danish unionization rate is not driven by the changing composition of industries and firms and instead it is within-firm changes that are key to understanding this aggregate decline. The subsequent analyses test whether offshoring can explain these within-firm changes.

3.2 Empirical Specification

This section describes our firm-level and worker-level empirical analyses, which examines the relationship between offshoring and unionization rates.

3.2.1 Firm-Level Specification

Our empirical approach begins with a firm-level analysis that estimates following specification:

$$U_{jt} = \beta_1 \ln Off_{jt} + \gamma_j + \gamma_{nt} + \gamma_{rt} + \varepsilon_{jt}, \tag{4}$$

where U_{jt} is the share of workers at firm j in year t that are unionized. The key independent variable of interest is the natural logarithm of offshoring by firm j in year t (see equation 1). The empirical specification controls for firm fixed effects (γ_j), industry*year fixed effects (γ_{nt}) and region*year fixed effects (γ_{rt}). This accounts for a wide set of potentially confounding factors such as time-invariant differences across firms; industry specific

[26]The unionization rate declined 7.9 percentage points over the sample and (6.7/7.9)*100 = 85%.

skill-biased technical change or import competition (Ahlquist and Downey, 2023; Charles et al., 2023); and region specific labor market tightness (Pezold et al., 2023). Finally, robust standard errors are clustered at the firm-year level.[27]

Equation (4) examines how within-firm changes in offshoring affects within-firm changes in unionization rates, which Figure 3 showed are the key to understanding the overall decline in Danish unionization rates. We are particularly interested in β_1 and anticipate that this coefficient will be negative (β_1<0).

It is possible that offshoring decisions could depend on unionization rates (Kramarz, 2008) or other unobserved time-varying firm-level characteristics. To address these endogeneity concerns, we instrument for offshoring in equation (4), with our threat of offshoring variable in a two-stage least squares (2SLS) empirical specification. By identifying variation in offshoring that is driven by plausibly exogenous factors that are unrelated to domestic firm characteristics, we are able to identify the causal effect of offshoring on unionization rates.

We also estimate a reduced-form version of equation (4), which regresses unionization rates directly on the threat of offshoring. This accounts for the possibility that what matters in the negotiations between the firm and union is not whether the firm has actually offshored jobs but whether they can credibly threaten to offshore. This is inline with evidence that the *threat* of foreign competition has important implications for firm behavior (Bloom et al., 2016) and is consistent with reduced-form specifications used in other contexts (Ahlquist and Downey, 2023).

3.2.2 Worker-Level Specification

While the firm-level analysis in equation (4) represents a significant improvement over industry-level analyses common in the literature, we can exploit the appealing aspects of our data set by focusing even more specifically on the union decisions of individual workers. This allows us to examine how offshoring affects the union decisions of specific employees in the following worker-level specification:

$$U_{ijt} = \beta_1 \ln Off_{jt} + \gamma_{ij} + \gamma_{nt} + \gamma_{rt} + \varepsilon_{ijt}. \tag{5}$$

where now U_{ijt} is a binary variable indicating whether worker i at firm j in year t is a union member. Offshoring

[27] We follow the existing literature (Hummels et al., 2014) and cluster our standard errors at the firm-year level. Alternatively, they could be clustered at the firm-level, but Abadie et al. (2023) shows that clustering can lead to "severely inflated" standard errors, especially when the sample is a large fraction of the population (our dataset includes the *universe* of firms) and when there is variation in treatment within clusters (which applies to firm-level clustering in our context). Nonetheless, Appendix Table A5 shows that our results are statistically significant regardless of whether standard errors are robust, clustered at the firm-year level, or clustered at the firm level.

is measured as before, we continue to include industry*year (γ_{nt}) and region*year (γ_{rt}) fixed effects, and our standard errors are clustered at the firm-year level. The key difference in this specification is that it is now possible to include a rigorous set of job-spell fixed effects (γ_{ij}). This will control for potentially confounding time-invariant worker and firm characteristics. Importantly, the inclusion of these worker-firm pair fixed effects, means that this specification identifies how firm-level offshoring affects union membership decisions of workers that continue to work at the same firm.

If offshoring is affecting unionization rates simply because it is altering the composition of workers employed at the firm (i.e. union workers are disproportionately laid off) then we will find that $\beta_1 = 0$.[28] However, if offshoring is reducing the likelihood that continuing employees are part of the union, then we will find that $\beta_1 < 0$. To identify the causal impact of offshoring on unionization decisions, our exogenous threat of offshoring measure is used as an instrument in a two-stage least squares (2SLS) empirical specification. In addition, we estimate a reduced-form version of equation (5) that regresses union density directly on the threat of offshoring.

3.3 Firm Unionization Results

We estimate the relationship between offshoring and the unionization rate at the firm-level using the specification in equation 4. Results reported in column 1 of Table 1 show that there is a negative but insignificant relationship between offshoring and the unionization rate after accounting for firm fixed effects, industry*year fixed effects, and region*year fixed effects. We are cautious about over-interpreting this finding, due to endogeneity concerns such as heavily unionized firms offshoring more (Kramarz, 2008). This would introduce a spurious positive bias in this OLS coefficient, which could explain the insignificant findings in column 1.

To address this possibility, column 2 instruments for offshoring using our threat of offshoring measure. This identifies variation in offshoring that is unrelated to endogenous firm-level conditions. The relatively strong first-stage results (i.e. a coefficient of 0.23 and a F-stat of 13) indicates that the exogenous growth in foreign suppliers is a good predictor of actual offshoring, as we saw in Figure 2. The second-stage results in column 2 indicate that offshoring reduces the firm-level unionization rate. The statistically significant -0.028** coefficient indicates that a doubling of offshoring reduces the unionization rate by 2.8 percentage points. We see that focusing on the causal effect of offshoring on union density leads to a more negative relationship in

[28] Hummels et al. (2014) find no evidence that union workers are disproportionately displaced due to offshoring; the pre-offshoring union status is the same for stayers and leavers (see their Table 9). Alternatively a cohort-analysis can track the outcomes of separated workers, in order to address concerns about selection on unobervables. However, offshoring estimates from a job-spell analysis and a cohort analysis are similar (i.e. -0.022 in column 3 of Table 5 and -0.027 in column 2 of Table 10 of Hummels et al. (2014)), which indicates that selection effects are of minimal concern.

column 2, which is consistent with a spurious positive bias in the OLS specification in column 1.

A simple back of the envelope calculation provides insight into the magnitude of this effect. Specifically, for each firm in our dataset, we calculate the actual change in offshoring. We then multiply this by the coefficient in column 2 to identify the offshoring-induced decline in the unionization rate for each firm. Taking a weighted average across firms (using 1999 employment as the weights), we get a predicted decline in the unionization rate of 1.7 percentage points. This means that offshoring can explain 25% of the observed within-firm decline in the Danish unionization rate (Figure 3).

Finally, Column 3 of Table 1 reports our reduced-form findings that regresses unionization rates directly on the threat of offshoring variable. Results show that an exogenous increase in the threat of offshoring leads to a statistically significant reduction in the firms' unionization rate. Comparing column 1 and 3, we see that union density appears to be more responsive to the threat of offshoring than to actual offshoring (although the potential spurious positive endogeneity bias in the former complicates this comparison). This is consistent with the idea that the firm's ability to threaten offshoring, by pointing for instance to growth in foreign suppliers, may matter more for negotiations with the labor union than whether the firm ultimately decides to actually offshore the jobs (Bloom et al., 2016; Ahlquist and Downey, 2023).

Table 1: Firm-Level Regression

Dependent Variable	Firm Unionization Rate		
Method	OLS	2SLS	OLS
	(1)	(2)	(3)
Log Offshoring	-0.0003	-0.0280**	
	(0.0005)	(0.0114)	
Log Offshoring Threat			-0.0065***
			(0.0020)
Observations	16,600	16,600	16,600
R-squared	0.863	0.863	0.863
Firm	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes
First stage IV coefficient		0.2315***	
F-test instrument		12.78	

Notes: The sample includes manufacturing firms with at least 50 employees and covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. Offshoring is measured using the narrow definition (world, HS4). Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.4 Worker Unionization Results

The decline in the unionization rate is not driven by the changing composition of industries and firms but rather is due to within-firm changes (Figure 3), and more specifically we find that within-firm changes in offshoring leads to within-firm declines in unionization rates (Table 1). However, it is still possible that offshoring could alter the composition of the workforce within the Danish firm. For example, if union jobs are disproportionately offshored then we could observe a decline in the within-firm unionization rate due to changes in the composition of workers.

We address this possibility by utilizing our individual worker-level information on union membership. This provides an opportunity to examine how firm-level offshoring affects the unionization decisions of individual employees. Specifically, our empirical specification includes job-spell fixed effects (see equation 5) and thus identifies how changes in firm-level offshoring affects unionization decisions of workers within a firm-employee match. Focusing on the changing unionization decisions of workers that continue to be employed at the same firm eliminates the possibility that offshoring-induced compositional changes in the workforce are influencing our results.

Table 2: Worker-Level Regression

Dependent Variable	Worker Union Membership Dummy		
Method	OLS	2SLS	OLS
	(1)	(2)	(3)
Log Offshoring	-0.0005***	-0.0156**	
	(0.0002)	(0.0062)	
Log Offshoring Threat			-0.0038***
			(0.0010)
Observations	3,745,655	3,745,655	3,745,655
R-squared	0.843	0.843	0.843
Job-Spell	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes
First stage IV coefficient		0.2471***	
F-test instrument		10.87	

Notes: The sample includes manufacturing firms with at least 50 employees, it includes workers aged 18 to 65, and it covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. Offshoring is measured using the narrow definition (world, HS4). Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 reports our worker-level regression results. In column 1, we see that there is a statistically significant negative relationship between offshoring and union membership. However, the magnitude of this effect is

relatively small, perhaps due to the spurious positive endogeneity bias discussed earlier. Column 2 reports our 2SLS results which identify an exogenous source of variation in offshoring driven by growth in foreign suppliers that affects some Danish firms more than others based on presample input sourcing decisions. Again our offshoring instrument is a relatively strong predictor of actual offshoring (i.e. a coefficient of 0.25 and a F-stat of 11). The second stage coefficient on offshoring (-0.016**) is negative and statistically significant. This indicates that an exogenous increase in offshoring leads to a decline in the union membership of workers who continue to work at the same firm.

The reduced form results are reported in column 3 of Table 2, and they show that the exogenous threat of offshoring leads to a significant decline in union membership. By looking within a worker-firm match, this finding is not driven by offshoring-induced changes in the composition of employees, and again we see that the threat of offshoring has important ramifications for union membership. Additional results (Table A6) indicate that the findings in column 3 are driven by both existing union members being more likely to exit the union and non-members being less likely to join the union in response to offshoring. Specifically, we can split the sample according to whether the worker began the job-spell as a union or non-union member and we find that the offshoring threat reduces the likelihood that existing union members remain in the union, and it reduces the likelihood that non-union members join the union. Both the exit and entry margins appear to be important and the magnitude of these effects are similar, although only the former is statistically significant presumably due to the larger sample size.

The reduced form firm-level estimate in Table 1 (-0.007***) and worker-level estimate in Table 2 (-0.004***) are qualitatively similar, but the latter are smaller in magnitude. This suggests that both compositional changes in the workforce and non-compositional factors are important. Specifically, taken at face value these estimates indicate approximately one third of the offshoring-induced decline in the unionization rate is due to compositional changes in employment, while two thirds of the decline is due to changes occurring within the job-spell.[29] We conclude that the observed decrease in union density is not simply because offshoring changes the composition of the workforce, and that changes in union bargaining power remains a plausible and potentially important explanation.

To reduce endogeneity concerns, our offshoring threat measure is constructed using presample firm-level import shares. It is possible that these shares become less relevant over time, which should if anything attenuate our findings. To address this possibility, we construct a new offshoring threat measure, which is analogous to

[29] Specifically, the ratio of the worker-level estimate to the firm-level estimate is -0.0038 / -0.0065 = 58%.

our baseline approach except it uses the presample shares from the year prior to the start of the *job-spell* rather than the firm's presample year. This is still plausibly exogenous from the perspective of the worker-firm match, but has the benefit of more accurately reflecting the sourcing decisions of the firm at that time. The results using this alternate offshoring threat measure are reported in Table A7. The point estimates in columns 2 and 3 are negative, statistically significant, and considerably larger in magnitude than the analogous baseline findings from Table 2. This confirms that potentially imprecise presample shares attenuate our results.

In Table A8 we show that our findings are robust to the inclusion of a variety of time-varying firm characteristics. In columns 2 and 3 we see that workers at larger firms, in terms of sales and employment, are less likely to be union members. However, the inclusion of these controls do not meaningful affect the offshoring coefficient, which remains negative, statistically significant, and similar in magnitude. Controlling for the firms' capital-to-labor ratio does not alter our findings either (see column 4). We also examine whether our results are influenced by firms directly reselling imports (Bernard et al., 2019), rather than using the imports in the production process. Data from the Account Statistics register is used to construct a "Retail Share" variable that measures the share of total inputs purchased for resale without adding value. This is uncommon in our sample, with median and mean values of 1.6% and 11.2% respectively, and adding this control does not change our offshoring results in column 5 of Table A8. Finally, Inward FATS data is used to measure foreign ownership of the firm. Despite the smaller sample size (it is only available from 2002 to 2016), the offshoring coefficient remains negative and significant after controlling for foreign ownership in column 6.

3.5 Occupations and Wage-Setting System Results

This section explores whether the relationship between offshoring and unionization rates differ across occupations or firm-union bargaining settings. While the job-spell fixed effects reduce the possibility that compositional changes are driving our results, one remaining possibility is that offshoring may cause existing employees to be reassigned within the firm, perhaps from a unionized to a non-unionized occupation. To address this concern, Table 3 accounts for occupation-specific job-spells, by including firm-employee-occupation fixed effects.[30] The findings in column 1 from this much more demanding specification show that a rising threat of offshoring leads to a statistically significant decline in the probability that an employee at the same firm and in the same occupation is a member of the union.

The threat of offshoring may also be more relevant for some occupations than others, depending on the characteristics of the job itself. For instance, the amount of face-to-face contact that is required or the need

[30] Occupations are defined at the four-digit level, to be consistent with the level of detail of the Indexes used in columns 2 and 3.

Table 3: Worker-Level Regression, Occupation and Wage-Setting System

Dependent Variable	Worker Union Membership Dummy			
	(1)	(2)	(3)	(4)
Log Offshoring Threat	-0.0023**	0.0180***	-0.0068*	-0.0024**
	(0.0011)	(0.0041)	(0.0037)	(0.0010)
Log Offshoring Threat × Offshorability Index		-0.0347***		
		(0.0064)		
Log Offshoring Threat × Routine Task Intensity Index			0.0059	
			(0.0048)	
Log Offshoring Threat × Firm-level Bargaining				-0.0014**
				(0.0006)
Observations	3,317,345	3,075,495	3,075,495	3,329,273
R-squared	0.8822	0.8809	0.8809	0.8668
Job-Spell-Occupation	Yes	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes	Yes

Notes: The sample includes manufacturing firms with at least 50 employees and workers aged 18 to 65 covering the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. The Offshorability and Routine Task Intensity indices are based on Autor and Dorn (2013) and normalized to take values between 0 and 1. All columns include job-spell-occupation (ie worker-firm-occupation), industry-year, and region-year fixed effects. The job-spell-occupation fixed effects are at the four-digit occupation level in columns (1)-(3) and at the one-digit occupation level in column (4). Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

to be close to the worksite likely influences the offshorability of a task. An offshorability index is constructed using the "face-to-face contact" and "on-site job" variables from the US Department of Labor's Occupation Information Network (O*NET) database, following Autor et al. (2013). We measure offshorability at the four-digit occupation level and interact this with our offshoring threat variable. Results are reported in column 2 of Table 3.[31] As expected, the point estimate on the interaction term of interest is negative, relatively large in magnitude (-0.035***), and statistically significant. This indicates that the threat of offshoring disproportionately reduces union membership in more offshorable occupations. Take for example, "Structural and Metal Preparers and Erectors (7214)", which is the occupation in the 25th percentile according of the offshorability index, and "Technical and Commercial Sales Representatives (3415)" which is in the 75th percentile of offshorability. The estimates in column 2, show that doubling the offshoring threat has no impact on the former occupation but reduces the union membership of workers in the latter occupation by 0.5 percentage points.[32]

[31] We continue to include occupation-specific job-spell fixed effects.

[32] The offshorability index of "Structural and Metal Perparers and Erectors" is 0.5295, which means that if the offshoring threat doubles the likelihood that a worker in this occupation is in union does not change [(0.0180 + (-0.0347)*(0.5295))*100 = 0.0]. The offshorability index of "Technical and Commercial Sales Representatives" is 0.6717, which means that if the offshoring threat doubles the likelihood that this worker is a union member falls by 0.5 percentage points [(0.0180 + (-0.0347)*(0.6717))*100 = -0.5].

Perhaps our offshorability index is inadvertently correlated with other unobserved features of a task that could be related to union density. For instance, maybe it is related to how routine the occupation is, which in turn could influence unionization rates. We test for this possibility by measuring the routine task intensity of occupations following Autor et al. (2013). Results in column 3 of Table 3 show that the firm's ability to threaten offshoring has no differential impact on routine tasks. This indicates that the column 2 results are specific to the offshorability of the job and they are not inadvertently capturing the routine nature of the task.

Rather than focusing on the characteristics of the job (i.e. how offshorable or routine it is), another approach is to focus on the characteristics of the worker. In results reported in Appendix Table A9, we investigate whether the threat of offshoring affects some types of workers more than others. These results show that offshoring disproportionately reduces union membership of young, female, high-skilled, and native workers.[33]

Finally, the bargaining system may influence the extent to which firm-level offshoring threats affect union benefits and membership. As discussed in Section 2.1 collective bargaining agreements are negotiated at the sector-level, the firm-level, and at a two-tiered level. Firm-level bargaining is the most flexible wage-setting system where firm-specific conditions, such as offshoring, are more likely to affect bargaining outcomes. We follow Dahl et al. (2013) and define bargaining segments of the labor market at the occupation-industry level and use information from the Confederation of Danish Employers to determine the wage-setting system of each segment.[34] In column 4 we interact an indicator variable for firm-level bargaining with our offshoring threat variable. The coefficient on the interaction term of interest is negative and statistically significant. This confirms that the threat of offshoring disproportionately reduces union membership when bargaining occurs at the firm level.

Overall, the results in this section show that the threat of offshoring reduces the unionization rate at the firm (Table 1), reduces the likelihood a worker is a union member within an job-spell (Table 2), reduces union membership even within an occupation-specific job spell (Table 3), and reduces unionization rates more in the anticipated places (Table 3).

4 Union Bargaining Power

Our results so far provide compelling evidence that offshoring is reducing unionization rates and this relationship is not driven by compositional changes in industries, firms, or workers. Declining union bargaining power

[33] Young workers are those that are less than 40 years old and high-skilled workers are those with a tertiary degree.

[34] These bargaining segments are defined at the one-digit occupation level and thus our occupation-specific job-spell fixed effects are also defined at the one-digit level.

remains a viable explanation for these findings, and this sections uses insights from the standard bargaining model (Abowd and Lemieux, 1993) to guide two additional empirical tests of this hypothesis.

4.1 Standard Bargaining Model

In the standard bargaining model the firm and the union negotiate over wages and employment. Specifically, the bargaining outcome between a rent-maximizing union and a profit-maximizing firm leads to the following Nash solution (Abowd and Lemieux, 1993; Card et al., 2018):

$$w = \gamma(rent) + x \tag{6}$$

where the union wage (w) is equal to the alternate non-union wage (x) plus a fraction of the firm's rents. The rent-sharing parameter $\gamma \epsilon [0, 1]$ identifies the fraction of rents that are captured by union workers. A relatively strong union will have more bargaining power, γ will be larger, and thus union wages will be relatively higher. Futhermore, in our context, we are particularly interested in whether offshoring alters the unions' bargaining power. We use these basic insights from this standard bargaining model to guide our subsequent empirical approaches.

4.2 Union Wage Premium Specification

The first testable prediction that comes out of this bargaining setting is that there is a union-wage premium. Assuming there are positive rents and $\gamma \neq 0$, then we see from equation (6) that the union wage will be larger than the non-union wage: $w > x$. We test this hypothesis using a standard Mincerian wage regression of the following form:

$$\ln w_{ijt} = \alpha_1 \, Union_{ijt} + \alpha_2 \ln Off_{jt} + \alpha_3 \, Union_{ijt} * \ln Off_{jt} + Y_{it} * \alpha_4 + \gamma_{ij} + \gamma_{nt} + \gamma_{rt} + \varepsilon_{ijt} \tag{7}$$

where w_{ijt} is the hourly wage of worker i at firm j in year t, $Union_{ijt}$ is a binary variable indicating whether worker i at firm j in year t is a union member, and Off_{jt} if our offshoring threat variable at firm j in year t. We control for time-varying worker characteristics Y_{it} (which includes labor market experience, education, and occupation) and we account for job-spell fixed effects (γ_{ij}), industry*year fixed effects (γ_{nt}), and region*year fixed effects (γ_{rt}).

If a union worker earns more than a similar non-union workers then $\alpha_1 > 0$.[35] We account for the possibility

[35] Figure 1 documented how this union wage premium changed over time.

that offshoring can directly affect wages, of both union and non-union workers, by including the uninteracted offshoring threat variable. While not the focus of this analysis, we note that the sign of α_2 can depend on the relative magnitudes of competing offshoring-induced effects, such as the labor supply effect, the relative price effect, and the productivity effect (Grossman and Rossi-Hansberg, 2008; Ottaviano et al., 2013; Olney, 2012; Ebenstein et al., 2014; Hummels et al., 2014). Specifically, offshoring can and often does increase wages, due to cost reducing and productivity enhancing effects. More importantly for our analysis, we test whether the threat of offshoring disproportionately reduces the union-wage premium, by interacting the union dummy with our offshoring threat variable in equation (7). If the firm can credibly threaten offshoring this may undermine the unions' bargaining position and reduce the relative wage of union members. Thus, we anticipate that the union-wage premium will be smaller at firms that can credibly threaten to offshore jobs ($\alpha_3 < 0$).

One potential complication is that non-union members are occasionally covered by the collective bargaining agreement. However, non-member coverage is more relevant for the sector-level wage floors than for the firm-negotiated wages, and to the extent that non-member coverage is relevant it should attenuate the α_1 coefficient. Another possible issue is that offshoring can change the workers' decision to be a union member, as our earlier results showed. We have two empirical approaches to deal with union membership switching. First, we include union-membership-specific job-spell fixed effects. This ensures that when we examine the impact of offshoring on the wage premium our results are not influenced by the selection of workers into or out of the union. A second and related approach is to drop job-spells where workers switch their union membership and instead focus exclusively on the non-switchers.

4.3 Rent-Sharing Specification

A second test of the standard bargaining model entails directly estimating the rent-sharing parameter (γ in Equation 6) in the following way (Abowd and Lemieux, 1993; Card et al., 2018):

$$\ln w_{ijt} = \alpha_1 \ln(rent)_{jt} + \alpha_2 \ln x_{jt} + \alpha_3 \ln Off_j + \alpha_4 \ln(rent)_{jt} * \ln Off_j + Y_{it} * \alpha_5 + \gamma_{ij} + \gamma_{nt} + \gamma_{rt} + \varepsilon_{ijt} \quad (8)$$

where w_{ijt} is the hourly wage of union worker i at firm j in year t; $rent_{jt}$ is the value added per worker at firm j in year t; and x_{jt} is the non-union hourly wage at firm j in year t.[36] While all workers may benefit from firm rents, we condition on the non-union wage to examine whether union wages *disproportionately* increase with firm rents due to the union's bargaining power. This basic specification (without the subsequent offshoring

[36] Being able to precisely measure the non-union wage at the firm using our detailed data, represents an important improvement over the existing literature which due to data constraints uses more aggregate industry wages (Abowd and Lemieux (1993).

terms) offers a direct test of equation (6), with the estimated rent-sharing coefficient (α_1) being of particular interest. We follow the newest "third generation" of rent-sharing specifications (Card et al., 2018) and control for worker quality with our time-varying worker-level controls in Y_{it}. Finally, our usual rigorous set of job-spell, industry*year, and region*year fixed effects are included.[37]

We address endogeneity concerns by identifying exogenous variation in firm rents using world import demand (WID). This WID instrument identifies variation in firm exports driven by changing conditions in the foreign importing country. Specifically, it is constructed using the firm's presample shares of exports of product k to country c and country c's growth in imports of product k from all countries except Denmark (Hummels et al., 2014).

We are particularly interested in whether the share of rents going to union workers changes with offshoring. Thus, equation (8) includes an offshoring threat binary variable ($Offshoring_j$) and it's interaction with firm rents. This allows us to examine whether exogenous variation in firm rents over time differentially affect union wages at firms that can threaten offshoring. We instrument for both firm rents and the interaction of firm rents with offshoring, using a WID and a WID*Offshoring instrument.[38] As is common in the rent-sharing literature we include the alternate non-union wage as a control, which ensures that we are not picking up broader offshoring-induced wage effects and instead are focusing on how offshoring disproportionately affects the wages of union workers. If offshoring does indeed erode the bargaining position of the union, we anticipate that union workers will enjoy a smaller fraction of rents at these firms and $\alpha_4 < 0$.[39]

4.4 Union Wage Premium Results

Results from estimating our union wage premium specification (Equation 7) are reported in Table 4. Before considering the implications of offshoring, Column 1 simply examines whether there is a union wage premium within a job-spell. The results show that when an existing worker, employed at the same firm, joins the union their hourly wage increases 1.5%. The magnitude of this union wage premium is consistent with existing evidence from Denmark and France (Hummels et al., 2014; Breda, 2015).

[37] The job-spell fixed effects account for firm-specific wage premiums that have been found to be important in studies relying on worker mobility across firms (Card et al., 2018; Abowd et al., 1999).

[38] Our focus in this analysis is on leveraging exogenous changes in firm rents, rather than on the variation over time in offshoring threats. Our binary offshoring variable identifies whether the average yearly change in the offshoring threat variable for firm j was larger than the sample average. The uninteracted offshoring measure will be subsumed by the job-spell fixed effects, while the interaction term will survive and is of primary interest.

[39] While we prefer to follow the existing literature (Abowd and Lemieux, 1993; Card et al., 2018) and use a theoretically consistent rent-sharing specification, alternatively we can estimate a reduced-form specification that interacts WID, offshoring, and union status. This generates similar results, with union workers disproportionately benefiting from an exogenous increase in firms rents. However, at offshoring firms these union-wage gains are significantly smaller, which confirms that the union's bargaining power is eroded.

Table 4: Union Wage Premium Regression

Dependent Variable	Log Hourly Wage		
	(1)	(2)	(3)
Union membership	0.0152***		
	(0.0012)		
Log Off. Threat		0.0342***	0.0363***
		(0.0085)	(0.0091)
Log Off. Threat × Union Membership		-0.0496***	-0.0493***
		(0.0066)	(0.0072)
Observations	2,688,380	2,652,799	2,338,595
R-squared	0.885	0.889	0.886
Worker Controls	Yes	Yes	Yes
Job-spell	Yes	No	Yes
Job-spell-Union Membership	No	Yes	No
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes

Notes: The sample includes manufacturing firms with at least 50 employees, it includes workers aged 18 to 65, and it covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. Offshoring is measured using the narrow definition (world, HS4). Worker controls (i.e. labor market experience, education, and occupation) are included in all columns. The 'Union Membership' is a binary variable indicating whether the worker is a union member. Columns 1 and 2 include the full sample, while Column 3 drops job spells where the worker switches union membership. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Having confirmed there is a union wage premium, we then test whether this premium varies with offshoring by including the offshoring threat variable and interacting it with union membership. We include union-membership specific job-spell fixed effects, to ensure that the estimated impact of offshoring on the union wage premium is not affected by compositional changes in membership. Results in column 2 show that the uninteracted offshoring coefficient is positive and significant, which indicates that firms that can threaten to offshore tend to pay higher non-union wages. While not the primary focus of this analysis, this result is consistent with an offshoring-induced "productivity effect," which can and often does increase wages (Grossman and Rossi-Hansberg, 2008; Ottaviano et al., 2013; Olney, 2012; Hummels et al., 2014).

More importantly for our purposes, we find in column 2 that the coefficient on the offshoring*union interaction term is negative and statistically significant (-0.05***). An exogenous increase in the firms' ability to threaten offshoring disproportionately reduces union wages compared to non-union wages. It is worth emphasizing that Table 4 controls for worker characteristics, such as experience, education, occupation, and time-invariant ability.[40] These findings provide additional evidence that is consistent with offshoring affecting

[40]Furthermore, including offshoring*education interaction terms in column 2 ($OffThreat*Skill$ and $OffThreat*Union*Skill$) does not meaningfully change our main OffThreat*Union coefficient (i.e. -0.05*** vs -0.04***). This indicates that our results are not inadvertently driven by offshoring differentially affecting workers with different education levels.

the bargaining power of the union.

Column 3 takes an alternate approach of dealing with potential compositional changes in union membership by dropping job-spells where a worker switches into or out of the union.[41] This method of examining how non-switchers are affected by changes in offshoring generates results that are qualitatively and quantitatively similar to those in Column 2. Again we see that the threat of offshoring disproportionately causes union wages to decline relative to the wages of otherwise similar non-union workers. Overall, these results indicate that offshoring is reducing the union wage premium and provides additional evidence that offshoring is undermining the bargaining power of the union.

4.5 Rent-Sharing Results

This section reports our rent-sharing results from estimating equation (8). We begin by examining how union wages depend on firm rents in an OLS specification reported in column 1 of Table 5. The results show that the union wage is not surprisingly positively related to the non-union wage at the firm, which indicates that some firms pay their workers more than others (Abowd et al., 1999). We also find that a modest positive coefficient on firm rents, but this relationship is not statistically significant. Column 2 addresses endoegeneity concerns by identifying an exogenous source of variation in firms rents using our WID instrument. The F-statistics on the excluded instrument of 27 indicates a relatively strong first-stage relationship (see the full first-stage results in Appendix Table A10). The second-stage rent-sharing coefficient in column 2 is positive and larger in magnitude than the OLS coefficient from column 1, which is consistent with existing evidence (Abowd and Lemieux 1993), but it is not statistically significant.

We are particularly interested in whether the rent-sharing parameter is different at offshoring firms. To test for this possibility, firm rents are interacted with our offshoring measure.[42] The OLS results in column 3 show that at non-offshoring firms, union wages disproportionately increase with firm rents conditional on non-union wages. The point estimate is 0.01*** and statistically significant. The coefficient on the rent*offshoring interaction term is negative, statistically significant, and similar in magnitude (-0.01***) to the uninteracted rent coefficient. This indicates that at offshoring firms, the share of firm rents going to union workers is close to zero. Similar results are obtained in column 4 using our 2SLS specification which instruments for both rents and rents*offshoring using our WID instrumental variable.[43] Reassuringly the rent-sharing estimates in

[41] We return to using the normal job-spell fixed effects in this specification. Similar results are also obtained if we define union membership as whether the worker was in the union in the first year of the job-spell.

[42] The uninteracted offshoring variable is time invariant and is thus absorbed by the job-spell fixed effects in columns 3 and 4.

[43] The first-stage results reported in Appendix Table A10 show that the WID and the WID*Offshoring instruments are strong predictors of the endogenous variables they were designed to predict, while the cross-effects are smaller in magnitude or insignificant.

Table 5: Rent-Sharing Regression

Dependent Variable	Log Hourly Union Wage			
Method	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)
Log Rents	0.0026	0.0288	0.0111***	0.0998*
	(0.0026)	(0.0328)	(0.0038)	(0.0519)
Log Rents × Off. Threat Dummy			-0.0142***	-0.0756**
			(0.0051)	(0.0339)
Hourly Non-Union Wage	0.1489***	0.1482***	0.1488***	0.1467***
	(0.0092)	(0.0092)	(0.0092)	(0.0093)
Observations	2,228,302	2,228,302	2,228,302	2,228,302
R-squared	0.872	0.872	0.872	0.872
Worker Controls	Yes	Yes	Yes	Yes
Job-Spell	Yes	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes	Yes
F-test WID		27.72		13.86
F-test WID × Off. Threat Dummy				53.87

Notes: The sample includes union members in manufacturing firms with at least 50 employees, it includes workers aged 18 to 65, and it covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. The dummy for threat of offshoring is measured using the narrow definition (world, HS4). The dummy takes the value 1 if the average yearly change in the offshoring threat variable over the period is larger than for the average worker. Worker controls (i.e. labor market experience, education, and occupation) are included in all columns. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

columns 3 and 4 range between 0.01 and 0.10, which is similar to the rent-sharing elasticity of 0.08 typically found in other studies that control for worker quality (Card et al., 2018). More importantly, we see in column 4 that while union wages increase with firm rents, at offshoring firms the rent-sharing elasticity is significantly smaller (-0.08**).[44] This indicates that union workers obtain a smaller fraction of rents at these firms, which is consistent with offshoring reducing the bargaining power of the union.

Overall the union-wage premium and rent-sharing results confirm that offshoring erodes the bargaining power of the union and disproportionately decreases the benefits of union membership. This in turn reduces incentives for workers to join or remain in the union and thus decreases unionization rates, as our previous results showed.

[44] Additional results show that this is primarily due to offshoring dampening the union wage benefits associated with *positive* shocks to firm rents.

5 Conclusion

Labor unions are important advocates for workers, however unionization rates have steadily fallen post-WWII. This paper examines the role that globalization has played in this decline using an appealing employer-employee data set that covers the universe of firms and workers over the last two decades. This allows us to identify how changes in firm-level offshoring affects union membership decisions of individual employees, while controlling for a wide variety of potentially confounding factors.

The results show that an exogenous increase in offshoring reduces unionization rates. Specifically, offshoring can explain about a quarter of the decline in the unionization rate over the last twenty years. This finding is not simply driven by offshoring-induced compositional changes in industries, firms, workers, or occupations. Instead, even within an employer-employee match, our results show that the threat of offshoring reduces the likelihood that a worker joins or remains in the labor union, which points to a bargaining power explanation. As expected, this effect is found to be stronger in more offshorable occupations and in more flexible wage-setting systems.

Two additional results confirm that this negative relationship is due to offshoring reducing the bargaining power of the union. First, we show that there is a union wage premium, which is declining over time, and is smaller at firms that can threaten to offshore jobs. Second, a rent-sharing specification shows that union workers receive a relatively smaller share of rents at offshoring firms. Overall, the empirical evidence in this paper indicates that offshoring reduces the bargaining power of the union, erodes the wage-benefits of union membership, and thus decreases unionization rates.

The findings of this paper have important policy ramifications. While the decline in union density post-WWII has been well-documented, there is little consensus on why this is happening. We show that globalization, and in particular offshoring, is playing a more important role in the decline of unions than previously realized. This has notable implications for the future of organized labor. These findings also identify an additional distributional implication of globalization. Not only are there direct negative consequences for less-skilled workers, but we find that the organizations that typically negotiate on behalf of these workers are also declining due to globalization.

References

Abadie, A., Athey, S., Imbens, G. W. and Wooldridge, J. M. (2023), 'When should you adjust standard errors for clustering?', *The Quarterly Journal of Economics* **138**(1), 1–35.

Abowd, J. M., Kramarz, F. and Margolis, D. N. (1999), 'High wage workers and high wage firms', *Econometrica* **67**(2), 251–333.

Abowd, J. M. and Lemieux, T. (1993), 'The effects of product market competition on collective bargaining agreements: The case of foreign competition in Canada', *The Quarterly Journal of Economics* **108**(4), 983–1014.

Acemoglu, D., Aghion, P. and Violante, G. L. (2001), Deunionization, technical change and inequality, *in* 'Carnegie-Rochester Conference Series on Public Policy', Vol. 55, p. 229–264.

Ahlquist, J. S. and Downey, M. (2023), 'The effects of import competition on unionization', *American Economic Journal: Economic Policy* **15**(4), 359–389.

Autor, D. H. and Dorn, D. (2013), 'The growth of low-skill service jobs and the polarization of the US labor market', *American Economic Review* **103**(5), 1553–1597.

Autor, D. H., Dorn, D. and Hanson, G. H. (2013), 'The China syndrome: Local labor market effects of import competition in the United States', *American Economic Review* **103**(6), 2121–2168.

Baumgarten, D. and Lehwald, S. (2019), Trade exposure and the decline in collective bargaining: Evidence from germany, CESifo Working Paper No. 7754.

Bell, B., Bukowski, P. and Machin, S. (2024), 'The decline in rent sharing', *Journal of Labor Economics* **42**(3).

Bernard, A., Blanchard, E., Van Beveren, I. and Vandenbussche, H. (2019), 'Carry-along trade', *Review of Economic Studies* **86**, 526–563.

Bernard, A., Fort, T., Smeets, V. and Warzynski, F. (2020), Heterogeneous globalization: Offshoring and reorganization, NBER Working Paper No. 26854.

Bhuller, M., Moene, K. O., Mogstad, M. and Vestad, O. L. (2022), 'Facts and fantasies about wage setting and collective bargaining', *Journal of Economic Perspectives* **36**(4), 29–52.

Blanchflower, D. G. and Bryson, A. (2003), 'What effect do unions have on wages now and would 'what do unions do?' be surprised?', *NBER Working Paper No. 9973* .

Blanchflower, D. G. and Bryson, A. (2024), 'Unions, wages and hours', *NBER Working Paper No. 32471* .

Bloom, N., Draca, M. and Van Reenen, J. (2016), 'Trade induced technical change? The impact of Chinese imports on innovation, IT, and productivity', *The Review of Economic Studies* **83**(1), 87–117.

Borusyak, K., Hull, P. and Jaravel, X. (2022), 'Quasi-experimental shift-share research designs', *Review of Economic Studies* **89**, 181–213.

Botero, J. C., Djankov, S., La Porta, R., Lopez-de Silanes, F. and Shleifer, A. (2004), 'The regulation of labor', *Quarterly Journal of Economics* **119**(4), 1339–1382.

Breda, T. (2015), 'Firms' rents, workers' bargaining power and the union wage premium', *The Economic Journal* **125**, 1616–1652.

Card, D. and Cardoso, A. R. (2022), 'Wage flexibility under sectoral bargaining', *Journal of the European Economic Association* **20**(5), 2013–2061.

Card, D., Cardoso, A. R., Heining, J. and Kline, P. (2018), 'Firms and labor market inequality: Evidence and some theory', *Journal of Labor Economics* **36**, 13–70.

Charles, K. K., Johnson, C. M. S. and Tadjfar, N. (2023), 'Trade competition and the decline in union organizing: Evidence from certification elections', *Journal of Labor Economics* (forthcoming).

Cristea, A. D. and Lopresti, J. (2024), 'Organized labor when things go south: Unions and the labor market consequences of nafta', *Working Paper* .

Dahl, C., le Maire, D. and Munch, J. R. (2013), 'Wage dispersion and decentralization of wage bargaining', *Journal of Labor Economics* **31**(3), 501–533.

Ebenstein, A., Harrison, A. E., McMillan, M. S. and Phillips, S. (2014), 'Estimating the impact of trade and offshoring on American workers using the current population surveys', *Review of Economics and Statistics* **96**(4), 581.

Eckel, C. and Egger, H. (2009), 'Wage bargaining and multinational firms', *Journal of International Economics* **77**, 206–214.

Farber, H. S., Herbst, D., Kuziemko, I. and Naidu, S. (2021), 'Unions and inequality over the twentieth century: New evidence from survey data', *The Quarterly Journal of Economics* **136**(3), 1325–1385.

Feenstra, R. C. and Hanson, G. (1999), 'The impact of outsourcing and high-technology capital on wages: Estimates for the United States, 1979–1990', *The Quarterly Journal of Economics* **114**(3), 907–940.

Felbermayr, G., Hauptmann, A. and Schmerer, H.-J. (2014), 'International trade and collective bargaining outcomes: Evidence from German employer–employee data', *The Scandinavian Journal of Economics* **116**(3), 820–837.

Frandsen, B. R. (2021), 'The surprising impacts of unionization: Evidence from matched employer-employee data', *Journal of Labor Economics* **39**(4).

Goldsmith-Pinkham, P., Sorkin, I. and Swift, H. (2020), 'Bartik instruments: What, when, why, and how', *American Economic Review* **110**(8), 2586–2624.

Grossman, G. M. and Rossi-Hansberg, E. (2008), 'Trading tasks: A simply theory of offshoring', *American Economic Review* **98**(5), 1978–97.

Hirsch, B. T. (2008), 'Sluggish institutions in a dynamic world: Can unions and industrial competition coexist?', *Journal of Economic Perspectives* **22**(1), 153–176.

Hirsch, B. T. and Macpherson, D. A. (2003), 'Union membership and coverage database from the current population survey: Note', *Industrial and Labor Relations Review* **56**(2), 349–354.

Humlum, A. and Munch, J. R. (2019), Globalization, flexicurity and adult vocational training in Denmark, *in* 'Making Globalization More Inclusive - Lessons from Experience with Adjustment Policies', WTO.

Hummels, D., Jørgensen, R., Munch, J. and Xiang, C. (2014), 'The wage effects of offshoring: Evidence from Danish matched worker-firm data', *American Economic Review* **104**(6), 1597–1629.

Hummels, D., Munch, J. R. and Xiang, C. (2018), 'Offshoring and labor markets', *Journal of Economic Literature* **56**, 981–1028.

Jodar, P., Alos, R. and Vidal, S. (2011), 'Why do workers leave unions? Group differences between workers in CCOO-Catalonia', *Transfer: European Review of Labour and Research* **17**(4), 471–484.

Kovak, B. K., Oldenski, L. and Sly, N. (2021), 'The labor market effects of offshoring by U.S. multinational firms', *The Review of Economics and Statistics* **103**(2), 381–396.

Kramarz, F. (2008), Offshoring, wages, and employment: Evidence from data matching imports, firms, and workers, Working paper.

Kreiner, C. T. and Svarer, M. (2022), 'Danish flexicurity: Rights and duties', *Journal of Economic Perspectives* **36**(4), 81–102.

Kroft, K., Luo, Y., Mogstad, M. and Setzler, B. (2020), Imperfect competition and rents in labor and product markets: The case of the construction industry, NBER Working Paper No. 27325.

Lamadon, T., Mogstad, M. and Setzler, B. (2022), 'Imperfect competition, compensating differentials, and rent sharing in the U.S. labor market', *American Economic Review* **112**(1), 169–212.

Leisner, J., Munch, J. R., Nielsen, A. T. and Schaur, G. (2023), 'The impact of offshoring and import competition on firm-level carbon emissions', *IZA Discussion Paper Series 16556* .

Lommerud, K. E., Meland, F. and Straume, O. R. (2009), 'Can deunionization lead to international outsourcing?', *Journal of International Economics* **77**, 109–119.

Melitz, M. J. and Polanec, S. (2015), 'Dynamic olley-pakes productivity decomposition with entry and exit', *RAND Journal of Economics* **46**(2), 362–375.

Mezzetti, C. and Dinopoulos, E. (1991), 'Domestic unionization and import competition', *Journal of International Economics* **31**(1-2), 79–100.

Murphy, K. J. (2023), 'What are the consequences of right-to-work for union membership?', *ILR Review* **76**(2), 412–433.

Murphy, R. (2020), 'Why unions survive: Understanding how unions overcome the free-rider problem', *Journal of Labor Economics* **38**(4), 1141–1188.

Ogeda, P., Ornelas, E. and Soares, R. R. (2024), 'Labor unions and the electoral consequences of trade liberalization', *Journal of the European Economic Association* pp. 1–45.

Olney, W. W. (2012), 'Offshoring, immigration, and the native wage distribution', *Canadian Journal of Economics* **43**(3), 830–856.

Olney, W. W. and Pozzoli, D. (2021), 'The impact of immigration on firm-level offshoring', *The Review of Economics and Statistics* **103**(1), 177–195.

Ottaviano, G. I., Peri, G. and Wright, G. C. (2013), 'Immigration, offshoring, and American jobs', *American Economic Review* **103**(5), 1925–1959.

Pezold, C., Jager, S. and Nuss, P. (2023), 'Labor market tightness and union activity', *NBER Working Paper No. 31988* .

Pierce, J. R. and Schott, P. K. (2016), 'The surprisingly swift decline of US manufacturing employment', *American Economic Review* **106**(7), 1632–1662.

Rodrik, D. (1997), *Has Globalization Gone Too Far?*, Washington, DC: Institute for International Economics.

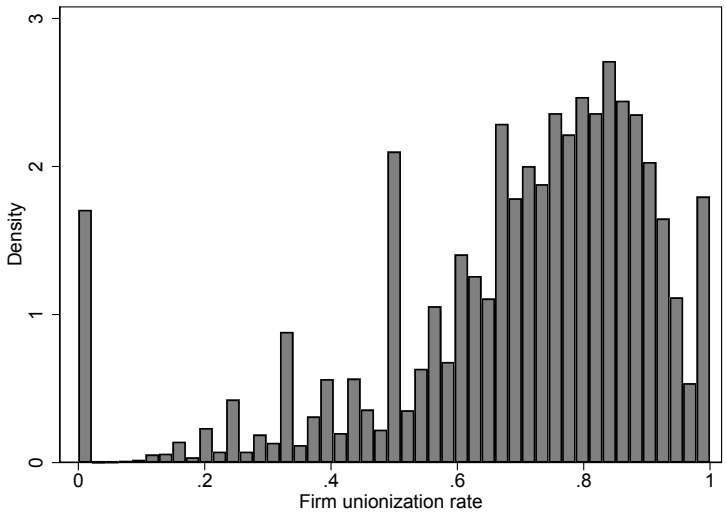
Slaughter, M. J. (2007), 'Globalization and declining unionization in the United States', *Industrial Relations: A Journal of Economy and Society* **46**(2), 329–346.

Stansbury, A. and Summers, L. H. (2020), 'The declining worker power hypothesis: An explanation for the recent evolution of the American economy', *Brookings Papers on Economic Activity* .

Waddington, J. (2006), 'Why do members leave? The importance of retention to trade union growth', *Labor Studies Journal* **31**(3), 1–38.

A Appendix Tables and Figures

Figure A.1: Distribution of Firm-Level Unionization Rates



Notes: This histogram reports the distribution of firm-year unionization rates among manufacturing firms.

Table A1: Union Entry and Exit within Job-Spells

Job spell length	Entry	Exit	Any union switch	Share of spells	Share of worker-years
1 year	0.000	0.000	0.000	0.332	0.079
2 years	0.036	0.027	0.063	0.171	0.081
3 years	0.055	0.042	0.088	0.110	0.078
4 years	0.067	0.055	0.106	0.074	0.070
5 years	0.068	0.063	0.109	0.058	0.069
6 years	0.070	0.069	0.113	0.046	0.065
7 years	0.073	0.074	0.117	0.038	0.063
8 years	0.084	0.089	0.135	0.028	0.053
9 years	0.087	0.092	0.139	0.024	0.051
All 10+ year spells	0.102	0.114	0.159	0.119	0.390
All 2+ year spells	0.065	0.062	0.105	0.668	0.921

Notes: The sample includes 1,219,164 job spells for the years 1999-2017. The "Entry" column shows the share of job spells where the worker joins the union at least once. The "Exit" column shows the share of job spells where the worker leaves the union at least once. The "Any union switch" column shows the share of job spells with at least one entry or exit.

Table A2: Import Summary Statistics

	All Import Flows	Offshoring Flows Only
Panel A: Totals		
Total unique products (HS4-codes)	1,222	1,133
Average yearly unique origin-products	12,457	11,913
Total unique origin-products	34,394	28,797
Panel B: Origin-product-level		
Number of firms importing an origin-product, median product	1.79	1.00
Number of firms importing an origin-product, average product	3.98	3.57
Panel C: Firm-level number of products		
Number of origin-products, median firm	33.74	23.95
Number of origin-products, average firm	53.63	42.98
Panel D: Share of total value of flows		
2 most imported origin-products, median firm	0.58	0.61
5 most imported origin-products, median firm	0.81	0.84
Panel E: Share of imports		
Offshoring, aggregate	0.97	-
Offshoring, median firm	0.95	-

Notes: This table presents calculations from firm-year-origin-product import flows. An origin-product is a combination of an origin country and an HS4 product code. All panels except Panel A (rows 1 and 3) calculate the stated statistic for each year separately and then reports the across-year average. The columns indicate the set of import flows (all or only those categorized as offshoring) used to calculate the statistic. Panel B calculates for each origin-product, how many firms that import it, and presents the median and average products. Panel C calculates the number of unique origin-products that a firm has in a given year, and then reports the median and average firm respectively. Panel D take each firm-year and calculates the share that the 2/5 most imported origin-products have out of that firm-year's total imports and offshoring respectively, and reports those statistics for the median firm. Panel E calculates the fraction of total imports (either at the aggregate or inside each firm-year) that offshoring flows constitute. The sample includes manufacturing firms with at least 50 employees and covers the years 1999 to 2017.

Table A3: Offshoring Threat at Industry Level

	2-digit industry	Share of emp. 1999	Share of emp. 2017	Log off. threat 1999	Log off. threat 2017	Change in log off. threat
10	Foods	13.50	14.93	12.39	13.09	0.70
11-12	Drinks and tobacco	2.59	0.80	13.19	12.73	-0.47
13	Textiles	2.02	1.13	11.82	12.21	0.39
14	Clothes	1.65	0.47	11.93	12.66	0.72
15	Leather	0.47	0.02	12.21	13.59	1.39
16	Wood and other products from trees	3.57	2.17	12.55	12.72	0.17
17	Paper and paper goods	2.63	1.81	13.01	12.90	-0.12
18	Media	1.54	1.07	13.22	12.80	-0.42
19-20	Chemical and mineral products	3.86	4.89	12.69	13.14	0.45
21	Pharmaceutical products	2.15	10.90	13.57	14.04	0.48
22	Rubber and plastic products	6.39	4.63	13.00	13.45	0.44
23	Other non-metal mineral products	4.57	4.23	12.24	12.44	0.20
24	Metal	3.22	1.85	12.60	13.13	0.53
25	Iron- and metal good industry	7.67	7.87	12.43	12.96	0.52
26	Computers, electronical and optical products	8.44	6.27	14.08	14.40	0.33
27	Electric equipment	4.11	3.90	13.47	14.18	0.71
28	Machines and equipment	20.51	21.14	12.90	13.39	0.49
29	Motor vehicles	2.48	1.43	13.57	14.55	0.97
30	Other means of transport	0.51	0.95	14.43	13.05	-1.38
31	Furniture	2.15	2.86	12.77	13.56	0.78
32	Other manufacturing	3.06	4.48	12.41	13.51	1.09
33	Repair and installation of machines and equipment	2.91	2.20	12.40	13.17	0.77

Table A4: Descriptive Statistics

	Observations	Mean	SD
Panel A. Firm-level data			
Log Offshoring	16,734	16.49	2.26
Log Threat of Offshoring	16,734	13.45	1.41
Firm Unionization Rate	16,734	0.81	0.10
Panel B. Worker-level data			
Union workers:			
Log Hourly Wage	2,459,816	5.241	0.313
Female	2,459,816	0.312	0.463
Age	2,459,816	42.30	10.56
Experience	2,459,816	20.62	10.62
High skilled	2,459,816	0.216	0.411
Non-union workers:			
Log Hourly Wage	483,211	5.397	0.446
Female	483,211	0.365	0.482
Age	483,211	39.78	10.92
Experience	483,210	16.13	10.96
High skilled	483,211	0.467	0.499

Notes: The sample includes manufacturing firms with at least 50 employees and covers the years 1999 to 2017.

Table A5: Standard Errors

Dependent Variable	Worker Union Membership Dummy		
Method	Robust	Firm*Year Clusters	Firm Clusters
	(1)	(2)	(3)
Log Offshoring Threat	-0.0038***	-0.0038***	-0.0038**
	(0.0007)	(0.0010)	(0.0019)
Observations	3,745,655	3,745,655	3,745,655
R-squared	0.8426	0.8426	0.8426
Job-Spell	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes

Notes: The sample includes manufacturing firms and covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. The offshoring threat variable uses presample shares from the year prior to the first year of the job spell. Column (1) shows robust standard errors, column (2) clusters standard errors at the firm-year level, and column (3) clusters standard errors at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Results by Initial Union Membership Status

Dependent Variable	Worker Union Membership Dummy		
Method	Full Sample	Initial Union	Initial Non-Union
	(1)	(2)	(3)
Log Offshoring Threat	-0.0038***	-0.0043***	-0.0058
	(0.0010)	(0.0011)	(0.0039)
Observations	3,745,655	3,156,442	589,213
R-squared	0.8426	0.6095	0.6665
Job-Spell	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes

Notes: The sample includes manufacturing firms and covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. The offshoring threat variable uses presample shares from the year prior to the first year of the job spell. Column (1) repeats column (3) from Table 2 for comparison, column (2) selects only job-spells where workers are union members in the first year, and column (3) selects only job spells where workers are non-union members in the first year. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Job-Spell Specific Offshoring Threat Measure

Dependent Variable	Worker Union Membership Dummy		
Method	OLS	2SLS	OLS
	(1)	(2)	(3)
Log Offshoring	-0.0004**	-0.0255***	
	(0.0002)	(0.0096)	
Log Offshoring Threat			-0.0059***
			(0.0010)
Observations	3,199,070	3,199,070	3,199,070
R-squared	0.8406	0.8406	0.8406
Job-Spell	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes
F-test instrument		8.358	

Notes: The sample includes manufacturing firms and covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. Offshoring is measured using the narrow definition (world, HS4). The offshoring threat variable uses presample shares from the year prior to the first year of the job spell. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Firm Controls

Dependent Variable	Worker Union Membership Dummy					
	(1)	(2)	(3)	(4)	(5)	(6)
Log Offshoring Threat	-0.0038***	-0.0027**	-0.0037***	-0.0032***	-0.0036***	-0.0024*
	(0.0010)	(0.0012)	(0.0010)	(0.0012)	(0.0010)	(0.0014)
Log Sales		-0.0030***				
		(0.0005)				
Log Employment			-0.0036***			
			(0.0008)			
Log Capital-Labor Ratio				-0.0005		
				(0.0003)		
Retail Share					0.0000	
					(0.0000)	
Foreign Ownership						-0.0009
						(0.0007)
Observations	3,745,655	3,587,693	3,745,655	3,590,571	3,540,894	2,930,480
R-squared	0.8426	0.8443	0.8427	0.8446	0.8439	0.8533
Job-Spell	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The sample includes manufacturing firms and covers the years 1999 to 2017 in columns (1)-(4), 1999 to 2016 in column (5) and 2002 to 2016 in column (6). Industries are measured at the NACE 2-digit level and there are five geographic regions. The Retail Share measures the share of firms' total input purchases resold without adding value using the Accounts Statistics data set. Foreign Ownership is a dummy variable indicating if the firm is owned by foreigners using the Inward FATS data set. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Worker Heterogeneity

Dependent Variable	Worker Union Membership Dummy			
	(1)	(2)	(3)	(4)
Log Offshoring Threat	0.0043***	-0.0023**	-0.0011	-0.0041***
	(0.0013)	(0.0011)	(0.0011)	(0.0010)
Log Offshoring Threat × Young	-0.0140***			
	(0.0014)			
Log Offshoring Threat × Female		-0.0045***		
		(0.0012)		
Log Offshoring Threat × High Skilled			-0.0151***	
			(0.0024)	
Log Offshoring Threat × Immigrant				0.0034*
				(0.0017)
Observations	3,745,655	3,745,655	3,745,655	3,745,655
R-squared	0.8427	0.8426	0.8427	0.8426
Job-Spell	Yes	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes	Yes

Notes: The sample includes manufacturing firms with at least 50 employees, it includes workers aged 18 to 65, and it covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. Offshoring is measured using the narrow definition (world, HS4). Young workers are less than 40 years old. High skilled workers have a tertiary education degree. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Rent-Sharing First Stage

Dependent Variable	Rent Sharing	Rent Sharing	Rent × Off. Dummy
	(1)	(2)	(3)
WID	0.1028***	0.0773***	-0.0056
	(0.0195)	(0.0188)	(0.0122)
WID × Log Offshoring Threat Dummy		0.0481*	0.2032***
		(0.0246)	(0.0200)
Hourly Non-Union Wage	0.0287	0.0288	0.0042
	(0.0222)	(0.0221)	(0.0188)
Worker Controls	Yes	Yes	Yes
Job-Spell	Yes	Yes	Yes
Industry-Year	Yes	Yes	Yes
Region-Year	Yes	Yes	Yes
Observations	2,223,692	2,228,302	2,228,302
F-test	27.83	13.86	53.87

Notes: The sample includes union members in manufacturing firms with at least 50 employees, it includes workers aged 18 to 65, and it covers the years 1999 to 2017. Industries are measured at the NACE 2-digit level and there are five geographic regions. The dummy for threat of offshoring is measured using the narrow definition (world, HS4). The dummy takes the value 1 if the average yearly change in the offshoring threat variable over the period is larger than for the average worker. Worker controls (i.e. labor market experience, education, and occupation) are included in all columns. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$