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# Offshoring and the Decline of Unions

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**Abstract**

Offshoring can reduce unionization rates by changing the composition of domestic employment or by eroding the union's bargaining power and thus decreasing the benefits of membership. Using an employer-employee matched data set we measure the exogenous threat of offshoring at the firm-level and union decisions of individual workers. Findings show that the threat of offshoring reduces unionization rates, even within a job-spell. This is not simply due to the changing composition of industries, firms, or workers, but is consistent with 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.

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

**JEL Classification:** F66, F16, J50

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# 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).[1] 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% in 2019), and declined in the U.S by 18 percentage points.[2] 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; Dodini et al., 2025). 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 the effects of offshoring, or the relocation of domestic jobs abroad, on unionization rates. By providing firms with an appealing outside labor option, offshoring generates cost-saving and productivity-enhancing effects, but it can also influence domestic union density through three main channels. First, the threat of displacement could theoretically increase unionization rates if workers believe that the union will protect their jobs. However, this is inconsistent with the widespread decline in union density observed across countries. Second, offshoring can alter the composition of domestic industries, firms, or workforces, thereby reducing unionization rates. For example, offshoring could lead to a decline in heavily unionized industries or cause unionized jobs within the firm to be relocated abroad. Third, the firms' ability to threaten offshoring may erode the bargaining position of the labor union in negotiations (Rodrik, 1997; Mezzetti and Dinopoulos, 1991; Eckel and Egger, 2009). The resulting less generous collective bargaining agreement reduces workers' incentives to be a union member. Consistent with these latter two hypotheses, workers frequently 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 examines 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

[1] See recent surveys by (Jäger et al., 2025; Kaplan and Naidu, 2024) for additional details about labor unions.
[2] Trade Union Density data is available at stats.oecd.org

studying the effects of globalization on union density. Denmark is highly integrated into global markets, with trade increasing and offshoring in particular becoming more common.[3] It has also traditionally been heavily unionized but consistent with broader global trends, unionization rates have steadily fallen over the last two decades (from 74% in 1999 to 65% in 2017). 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 to 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.[4] 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 in the manufacturing sector. This suggests that changes in the sectoral composition of the economy (i.e. declines in heavily unionized manufacturing firms and industries) is not driving the reduction in the 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).[5] 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 have three different methods of identifying plausibly exogenous variation in the firm's ability to threaten offshoring. The general approach is to identify growth in foreign suppliers which disproportionately

[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] This is consistent with other Scandinavian studies that also measure unionization at the individual-level (i.e. Dodini et al. (2024); Barth et al. (2020))

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

affects Danish firms that have either sourced this product from this foreign country in the past or can credibly threaten to do so in the future. We begin by using this offshoring threat measure in both a two-stage least squares (2SLS) and reduced-form specification. The benefit of the latter approach is that firm-union negotiations may depend on whether the firm can credibly threaten offshoring and not on whether the jobs are actually relocated abroad. Thus, our subsequent empirical analyses focuses more specifically on this latter specification using our preferred offshoring threat measure.

Our first set of results show that offshoring reduces unionization rates within the firm. Specifically, the 2SLS and reduced-form specifications both show that the threat of 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.[6]

It is possible that offshoring could alter the composition of workers within the firm.[7] To account for this, we 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 accounts for possible changes in the 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 a role, importantly we find that offshoring threats reduce 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, additional results include firm$\times$worker$\times$occupation job-spell fixed effects and still find a significant negative relationship between offshoring and union membership.[8]

We complement these findings with an event study analysis that examines how large firm-level increases in the threat of offshoring affect the union decisions of workers, irrespective of whether they stay at the firm or not. This provides insight into potential dynamic effects and it also allows us to track how offshoring affects the union decisions of different types of workers. Consistent with our earlier results, the findings show that

[6] See the back of the envelope calculation in Section 3.2

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

[8] Additional results confirm that the negative effect of offshoring on union density is stronger in occupations that are more offshorable (Autor and Dorn, 2013), stronger at firms with more flexible wage bargaining systems (Dahl et al., 2013), and stronger at firms that say that their motivation for offshoring is to lower wage costs. Findings also indicate that offshoring leads to both more exit from the union and less entry into the union.

workers who remain employed at the firm after the offshoring shock are less likely to be union members. We also find that workers who leave the firm in response to the offshoring shock and are re-employed elsewhere are also less likely to be union members. The magnitude of these two effects are similar and they both steadily grow in the decade after the offshoring shock. These findings indicate that the offshoring-induced decline in the unionization rate is due to both within job-spell changes, as well as declines associated with job displacement and reemployment.

Overall, this first set of results provide compelling evidence that offshoring reduces unionization rates. This relationship is not driven solely by compositional changes in industries, firms, or workers, which suggests that declines in the union's bargaining power likely plays a contributing role. If the union's bargaining position deteriorates due to offshoring, the wage benefits of being a union member are eroded, and thus the incentives for workers to join or remain in the union decline. Specifically, if the union wage premium falls relative to the cost of union dues, workers on the margin will no longer choose to be part of the union.[9] To formally test whether this bargaining power hypothesis can explain the observed negative relationship between offshoring and union density, we draw on insights from the standard bargaining model (Abowd and Lemieux, 1993) to guide two additional empirical approaches.

A Mincerian earnings equation is used to confirm that union workers do in fact receive a higher wage than otherwise similar non-union workers.[10] 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 coincides 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 provides additional evidence that offshoring is eroding the bargaining power of the union and thus reducing the wage-benefits of union membership, which is consistent with theoretical predictions from Mezzetti and Dinopoulos (1991) and Eckel and Egger (2009).

We support this analysis with a rent-sharing empirical specification (Card et al., 2018; Kroft et al., 2025; Lamadon et al., 2022). Our methodological contributions consist of including job-spell fixed effects, which addresses concerns that high ability workers select into more productive firms, and using plausibly exogenous variation in exports to identify changes in firm rents. The results show that at non-offshoring firms, union

[9] 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. Union dues are typically around 500-600 DKK per month.

[10] 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).

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, we highlight a new distributional implication of globalization. It has been well documented that globalization can adversely effect labor market outcomes of less-skilled workers (Autor et al., 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 likely mitigates 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. Papers often model offshoring as a way for firms to avoid high domestic wages by paying equally productive foreign workers a lower wage (Grossman and Rossi-Hansberg, 2008; Rodriguez-Clare, 2010). One implication is that the firm's ability to threaten offshoring can undermine the bargaining position of the labor union (Rodrik, 1997; Mezzetti and Dinopoulos, 1991; Eckel and Egger, 2009). We contribute to this theoretical work by providing one of the first careful empirical tests of this prediction. Other empirical studies of offshoring examine how offshoring affects the skill premium (Feenstra and Hanson, 1999); the effect 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). However, in this paper we are interested in the impact of offshoring on the unionization rate, which, given the rapid decline of labor unions in most developed countries, is an important and policy-relevant question. More generally our paper relates to a broader "race to the bottom" empirical literature that examines whether firms can avoid labor market regulations by relocating production abroad (Rodrik, 1996; Olney, 2013; Muñoz, 2025).

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.[11] Specifically, Ahlquist and Downey (2023) find that unionization rates increase in affected areas due to compositional changes as workers leave import-competing

[11] 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).

sectors and enter more highly-unionized sectors. On the other hand, Charles et al. (2026) 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. In contrast, Chinese import competition is akin to a negative demand shock for firms that tends to reduce rents and reallocate economic activity across firms and regions (Autor et al., 2013). Papers that share our focus (Kramarz, 2008; Lommerud et al., 2009; Sly and Soderbery, 2014) 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.[12] 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.[13] 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, summarize our data, and provide some descriptive evidence. Section 3 finds that the threat of offshoring reduces the unionization rate using both a firm-level and worker-level analysis. We complement these results with an event-study analysis in Section 4, which shows steady declines in unionization rates in the decade after the offshoring shock. Section 5 finds 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 6 provides some concluding thoughts.

## 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.

[12] While they do not focus on offshoring, Dodini et al. (2024) also study the effects going in the opposite direction by examining how exogenous changes in unionization rates affect firm power.

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

## 2.1 Danish Setting

There are a number of institutional features of 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.[14] These 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 the more decentralized firm-level negotiations, but these changes predate our sample period and have remained stable since (Jäger et al., 2025).[15] In our analysis, two-tiered bargaining and firm-level bargaining cover the majority of the private labor market (48% and 37% respectively), with only 15% of workers' wages negotiated at the sector level. Unions also negotiate with employer organizations over leave policies, pensions, working hours, holidays, professional development, and conflict resolution, with the government playing a passive role in this process.[16] Unemployment insurance benefits are provided by independent organizations called "A-kasse," which are separate legal entities from the union and membership is entirely voluntary.[17]

Third, the unionization rate in Denmark is relatively high, at 66%, compared to 10% in the U.S. (Kreiner and Svarer, 2022). This is noteworthy since membership is voluntary and non-union members are sometimes

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

[15] 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.

[16] However, unions and employer organizations do collaborate with the government in "triparty agreements" that set labor market policies (Kreiner and Svarer, 2022). See Dodini et al. (2023) for evidence on how union membership influences other non-wage outcomes over the worker's career.

[17] About half of the A-kasse share the name of the union (i.e. "3F A-kasse" and "3F Union") but they are distinct organizations and workers can sign up for each individually. Even if offshoring-induced concerns about job-loss led workers to join both the A-kasse and the union, this would generate a positive relationship between offshoring and union membership which would, if anything, work against our results.

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).[18] 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.[19] 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.[20]

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.[21] 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.

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

[18] 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.

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

[20] See Jäger et al. (2025) and "The Labour Market in Denmark" https://bm.dk/media/19251/the-labour-market-in-denmark.pdf

[21] 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 (around 80 DKK per month) and offer non-pecuniary benefits, such as legal advice, but they do not have the same bargaining rights as traditional unions.

## 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 to 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 recorded as deductions on workers' tax returns. In addition, we can measure worker characteristics, such as age, gender, labor market experience, education, immigrant status, and occupation.[22]

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. Our main offshoring and union variables are described in more detail in the next two sub-sections.

## 2.3 Offshoring Threat

This section begins by defining our actual offshoring variable and then introduces our preferred measure of offshoring threats. Offshoring is defined 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 construct a "narrow offshoring" measure that focuses on imported products that the firm could have produced themselves.

[22] 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.

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 $t$. This "narrow offshoring" measure focuses on firm $j$'s set of imports ($\Omega_j$) that it could potentially produce itself, which is defined as products within the same HS4 classification as firm production or exports.[23] Firm imports that are outside the $\Omega_j$ 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 from 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 A1. Using detailed firm-product-country-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).

Having defined the offshoring variable, we now turn to our preferred offshoring *threat* measure which has two appealing features. First, it identifies plausibly exogenous variation in offshoring, and thus can be used in a 2SLS empirical approach to address concerns that the decision to offshore may be related to unobserved firm-level characteristics. Second, it can be used in a reduced-form analysis, which accounts for the possibility that what may matter for firm-union negotiations is whether the firm can credibly threaten to offshore, not whether they actually relocate jobs abroad. More specifically, we measure offshoring threats using three different methods. Our first approach is to 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:

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

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

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 $t_0$. 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 ($\Omega_j$) 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 (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. Note that in our context $\sum_{ck}^{\Omega_j} s_{jckt_0} = 1$, which alleviates typical SSIV concerns that the instrument may be positively correlated with the sum of shares (Borusyak et al., 2025). As an additional check, we follow the recommended 'recentering' solution of controlling for the firm's offshoring share of sales and reassuringly the results are the same (see Table A7).[24]

We also utilize two additional offshoring threat measures that address the possibility that the firms' presample shares ($s_{jckt_0}$) become less relevant over time especially if the firm is offshoring new products to new countries. This is unlikley to be an issue in our setting because there is persistence in offshoring - specifically two thirds of firms offshore the same products to the same countries over the sample period (65% of firm-product-country goods that are offshored in 1999 are also offshored in 2017). Nonetheless, to address this potential concern our second offshoring threat measure uses the import shares from the year prior to the start of the job-spell in Equation 2, rather than the firms' presample year. This is still plausibly exogenous from the perspective of the worker-firm match, but has the benefit of reflecting more recent sourcing decisions. Our third approach uses the presample import shares of other similar firms within the same four-digit NACE industry, not including firm j itself. This captures the extensive margin of offshoring by including products and destinations that the firm does not offshore in the presample year but based on their competitors' activities they could credibly threaten to offshore. Reassuringly, the results using all three offshoring threat measures generate similar findings (Table 4).

It is possible that the offshoring threat measure is driven not only by exogenous supply shocks of product $k$ in country $c$ but also by potentially more endogenous global demand shocks for product $k$. However, Denmark

[24]This is analogous to controlling for the share of employment in manufacturing in the China shock literature (Autor et al., 2013), and provides additional confirmation that our identifying variation is coming from firms being differentially exposed to country-product-specific shocks and not from the firm's overall share of offshoring.

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 to account for time-varying global demand shocks, as well as skilled-biased technical change. Another potential concern is that the firm's import shares could be correlated with unobserved firm characteristics that could influence unionization rates. For instance, suppose high-tech firms started importing more of product $k$ from abroad and given the nature of their production process they 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 means that we identify changes in offshoring and unionization rates over time 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 similar to the World Export Supply (WES) instrument used by Hummels et al. (2014) and more generally the shift-share instrument variable (SSIV) approach. 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). Fortunately, there are a few appealing features of our setting and approach which reduce these concerns. First, the standard SSIV approach uses shares to identify differential exposure to a *common* shock (i.e. national industry-level Chinese imports) and thus 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 A1 shows that firm imports are concentrated in just a few origin-product goods, the set of origin-product goods that are imported differs across firms, 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 A1).

Second, the identifying assumptions of the SSIV approach are unlikely to be satisfied in specifications that rely 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 A1). Furthermore, 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.

The variation in our offshoring measure, across both countries and industries, is consistent with existing evidence. We find that Danish offshoring goes to other European countries, as well as the U.S. and China (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 A2 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. Furthermore, 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.[25]

## 2.4 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., 2026). Instead, we are able to construct a binary variable indicating whether each worker within the firm 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.

Following the existing literature (Hummels et al., 2014), our analysis focuses on manufacturing firms. These firms have comprehensive trade data and imports are more likely to reflect the relocation of production activities abroad (Hummels et al., 2014). Furthermore, the manufacturing sector is especially important in collective bargaining negotiations between Danish employers and unions, because large bargaining segments mainly in the manufacturing sector are typically the first movers and set the tone for negotiations in other sectors, including the public sector (Dahl et al., 2013).

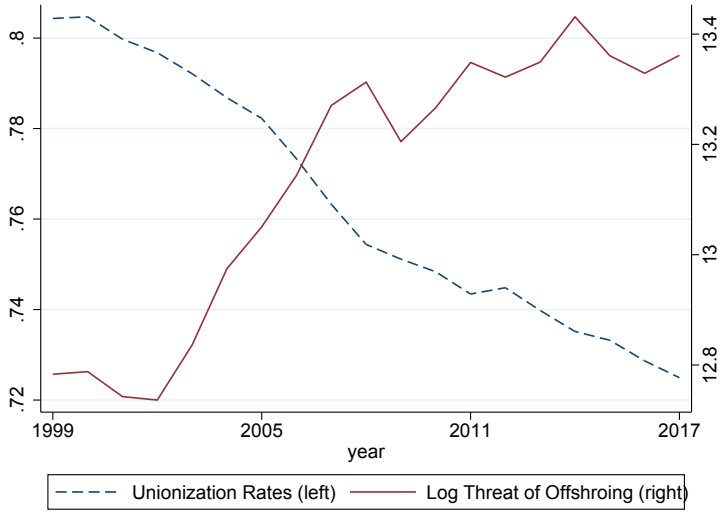
As shown in Appendix Figure A.1, the overall Danish unionization rate has steadily declined, from 74.0% in 1999 to 65.3% in 2017, which is consistent with evidence from a variety of developed countries (Bhuller et al., 2022). The decline in the union density in the manufacturing sector exhibits a similar trend, falling from 80.4% to 72.5% over this period, and Figure A.1 also shows related declines in the Service Sector, the Primary Sector, and the Public Sector. The similarity of these sectoral trends is unsurprising given Denmark's

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

collective bargaining tradition, in which the manufacturing sector is the first mover in negotiations. Once a "breakthrough" agreement is reached in manufacturing, this benchmark framework is then applied to other subsequent collective bargaining agreements in the rest of the private sector and the public sector (Kreiner and Svarer, 2022). This institutional feature of Danish labor union negotiations not only explains the sectoral variation seen in Figure A.1 but it also indicates that the declines in manufacturing are key to understanding aggregate trends. Thus, the decrease in the union density *within* the manufacturing sector, and the extent to which this is due to offshoring, is the focus of this analysis.

Figure 1 shows that this decline in the union density in the manufacturing sector coincides with a relatively rapid rise in offshoring. Specifically, the threat of offshoring increased about 80% from the late 1990s to the mid-2010s.[26] This time-series variation points to a possible relationship between offshoring and union density.

Figure 1: Offshoring Threat and Union Density




Notes: The threat of offshoring and the unionization rate is calculated for all employees in the manufacturing sector.

Appendix Figure A.2 shows the distribution of unionization rates at the firm-year level in the manufacturing sector. There is some bunching around zero, fifty, and one hundred percent. However, overall there is 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, it would be more challenging for us to identify the effect of offshoring on firm-level unionization rates.

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

## 2.5 Decomposition

An offshoring-induced decline in the unionization rate could be driven by the changing industrial composition of the manufacturing sector. 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. This section 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 change in the unionization rate ($\Delta\Phi$) in the manufacturing industry 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 $\varphi_{it}$ is the unionization rate at firm $i$ in year $t$.[27] 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.[28]

Figure 2 reports the findings from this decomposition exercise. We see that within-firm changes are by far the most important factor in explaining the decline in the union density. Specifically, within-firm changes lead to a 6.7 percentage point decline in the unionization rate, which explains 85 percent of the overall decline documented in Figure 1.[29] In contrast, 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.[30] We conclude from this decomposition exercise that the observed decrease in the union density is not driven by the changing composition of industries and firms in the manufacturing sector, and instead it is within-firm changes over time that are key to understanding this decline.

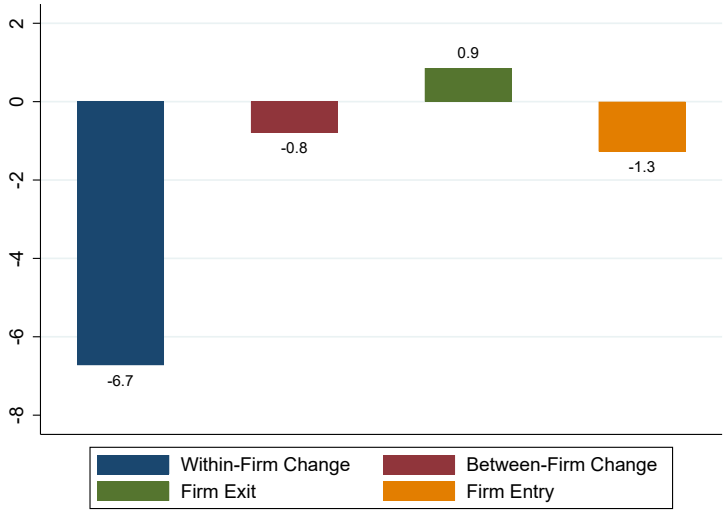
[27] Note that the shares $s_{it} \geq 0$ and sum to 1.

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

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

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

Figure 2: 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.

Consistent with this finding, workers frequently change their union membership status over time, even within an employer-employee match. For example, we show in Appendix Table A3 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.[31] 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-job-spell changes in union membership highlight the importance of carefully measuring union decisions at the firm and individual-level. The subsequent analyses test whether offshoring can explain these within-firm and within-job-spell changes.

## 2.6 Descriptive Statistics

Combining our various data sources, generates an employer-employee matched data set, which covers the universe of firms and the entire population of workers from 1999 to 2017. Our empirical analysis follows the standard convention of focusing on manufacturing firms with more than fifty employees, because smaller firms tend to have imputed balance sheet information and missing trade data (Hummels et al., 2014). Given that our offshoring variable is logged, our analysis utilizes firm-year observations with positive offshore values (i.e. firms that offshore at least one product to one foreign country in a given year). However, as Appendix Table A4 shows, the large manufacturing firms in our sample almost always offshore (the share of worker-year observations at offshoring firms is 4.2m/4.4m = 95%).

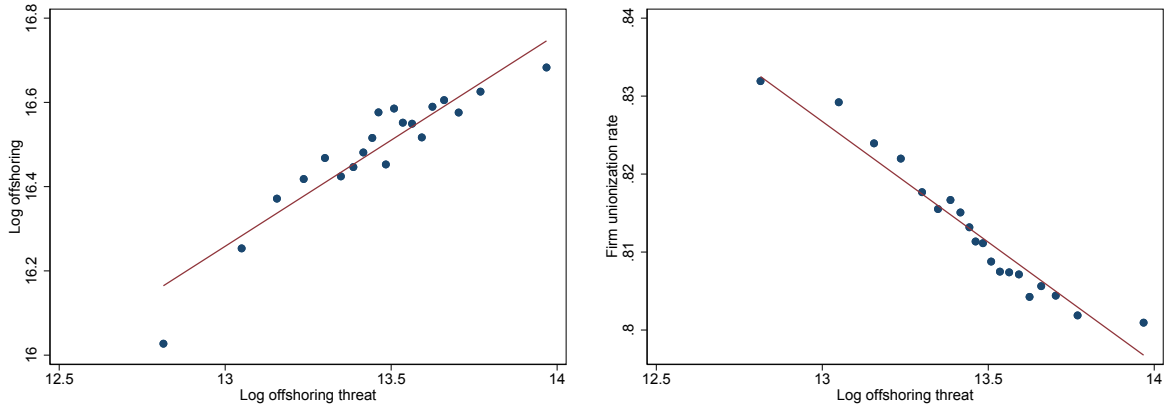
Our data set covers 69% of employment, 79% of sales, and 76% of value added in the manufacturing sector

[31] We also see that, not surprisingly, the switching rate is lower for short job-spells and higher for long job-spells.

(see Table A4). The descriptive statistics of the key variables used in our firm- and worker-level analysis are shown in Table A5. The sample includes over 16,000 firm-year observations and over 4 million worker-year observations. Panel B of Table A5 reports the characteristics of union and non-union workers, and we see fairly similar wage, gender, age, experience, and education profiles.

Figure 3 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 right side of Figure 3 plots the firm-level unionization rate directly against the threat of offshoring. This reduced-form relationship is of primary interest, because the ability for the firm to threaten offshoring may affect the union's bargaining power. A strong negative relationship is evident (consistent with Figure 1) which indicates that union density is decreasing with the threat of offshoring. Building on this evidence from Figure 3, the next section begins by reporting both 2SLS and reduced-form results, but later in the paper we focus more specifically on the latter specification using our preferred offshoring threat measure.

Figure 3: 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.

# 3 Unionization Rate

We pursue both a firm- and worker-level analysis that tests whether offshoring contributes to the decline in the unionization rate in Denmark.

### 3.1 Firm-Level Empirical 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). As we showed in Table A4, 95% of our sample of large manufacturing firms offshore and thus we lose relatively few observations by taking the log of offshoring. The empirical specification controls for firm fixed effects ($\gamma_j$), industry×year fixed effects ($\gamma_{nt}$) and region×year fixed effects ($\gamma_{rt}$). This accounts for a wide set of potentially confounding factors such as time-invariant differences across firms; industry specific skill-biased technical change or import competition (Ahlquist and Downey, 2023; Charles et al., 2026); and region specific labor market tightness (Pezold et al., 2023). Finally, robust standard errors are clustered at the firm-year level.[32]

Equation (4) examines how within-firm changes in offshoring affects within-firm changes in unionization rates, which Figure 2 shows are the key to understanding the overall decline in Danish unionization rates. We are particularly interested in $\beta_1$ and anticipate that this coefficient will be negative ($\beta_1$<0).

It is possible that offshoring decisions could depend on unionization rates (Kramarz, 2008; Sly and Soderbery, 2014) 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, we hope 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 in line 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).

[32] 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 A6 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.

### 3.2 Firm-Level Results

Firm-level results are reported in column 1 of Table 1 and 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.

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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To address this possibility, and other endogeneity concerns, column 2 instruments for offshoring using our threat of offshoring measure. 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 3. The second-stage results in column 2 indicate that offshoring reduces the firm-level unionization rate. The offshoring coefficient of -0.028 indicates that doubling 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 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 OLS specification 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).

### 3.3 Worker-Level Empirical Specification

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 2), and more specifically we find that within-firm changes in offshoring leads to a within-firm decline in the unionization rate (Table 1). While this firm-level analysis represents a significant improvement over industry-level analyses common in the literature, we go further by focusing even more specifically on the union decisions of individual workers. This allows us to examine whether offshoring is altering the composition of the workforce within the Danish firm or changing the unionization decisions of workers who continue to be employed at the firm.

We estimate 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 is measured as before, we continue to include industry$\times$year ($\gamma_{nt}$) and region$\times$year ($\gamma_{rt}$) 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 ($\gamma_{ij}$). 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.

Offshoring could affect unionization rates if it alters the composition of workers employed at the firm. For example, if union jobs are disproportionately offshored then we would observe a decline in the within-firm unionization rate simply due to changes in the workforce. In this case, we will find that $\beta_1 = 0$.[33] However, if offshoring reduces the likelihood that workers, who continue to work at the same firm, choose to be 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.

### 3.4 Worker-Level Results

Our worker-level regression results are reported in Table 2. 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 yet we still see that the threat of offshoring has important ramifications for union membership.

The reduced form firm-level estimate in Table 1 (-0.0065) and worker-level estimate in Table 2 (-0.0038) 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 that over half of the offshoring-induced decline in the unionization rate is due to changes occurring

[33] 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.

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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

within the job-spell, while the remainder is due to compositional changes in employment.[34] 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.

### 3.5 Occupations and Wage-Setting System Results

This section explores whether the relationship between offshoring and unionization rates differ across occupations or bargaining settings. While the job-spell fixed effects reduce the likelihood 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.[35] 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 to be

[34] Specifically, the ratio of the worker-level estimate to the firm-level estimate is -0.0038 / -0.0065 = 58%. The event study analysis in Section 4 will further examine the relative importance of these two explanations.

[35] 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

close to the worksite likely influences the offshorability of a task. Thus, 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 and Dorn (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.[36] 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.[37]

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

[37] 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 the 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 the offshorability of an occupation is correlated with other unobserved features of a task (i.e. how routine it is) that could be related to union density. We test for this possibility by measuring the routine task intensity of occupations following Autor and Dorn (2013). Results in column 3 of Table 3 show that the firm's ability to threaten offshoring has no differential impact on union membership in routine occupations. 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.

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.[38] 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.

### 3.6 Alternate Offshoring Threat Measures

We pursue two alternate approaches of constructing our offshoring threat measure. First, to address the possibility that import shares become less relevant over time, we calculate a new threat measure, which is analogous to our baseline approach except it uses import 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 firm's sourcing decisions at that time. The results using this alternate offshoring threat measure are reported in column 2 of Table 4 and are negative, statistically significant, and larger in magnitude (-0.006) than the analogous baseline findings (-0.004 re-reported in column 1). This indicates that using presample import shares in the baseline analysis, if anything, attenuates our findings.

Our second approach uses the presample import shares of other similar firms within the same four-digit NACE industry (not including firm j itself) to measure the threat of offshoring. This has the benefit of capturing the extensive margin of offshoring, by incorporating products and destinations that the firm may not offshore

[38] 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.

Table 4: Alternative Offshoring Threat Measures

| Dependent Variable | Worker Union Membership Dummy | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Log Offshoring Threat | -0.0038*** | | |
| | (0.0010) | | |
| Log Job-Spell Offshoring Threat | | -0.0059*** | |
| | | (0.0010) | |
| Log Industry Offshoring Threat | | | -0.0030** |
| | | | (0.0014) |
| Observations | 3,745,655 | 3,199,070 | 3,489,896 |
| R-squared | 0.8426 | 0.8406 | 0.8431 |
| 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. Column (1) repeats column (3) from Table 2 for comparison, column (2) has a job-spell specific offshoring threat variable, that uses presample shares from the year prior to the first year of the job-spell, and column (3) has an offshoring threat variable with presample shares based on imports by other firms in the same four-digit NACE industry (i.e., leave one out). Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

in the presample year but that they plausibly could based on the offshoring decisions of their competitors. Results in column 3 of Table 4 are similar in sign and magnitude to our baseline findings (-0.003 vs -0.004) and statistically significant. Overall, the results in Table 4 indicate that our findings are robust to other methods of measuring the exogenous threat of offshoring.

### 3.7 Offshoring Motives

The motive for offshoring likely influences the firm-union negotiations. For instance, offshoring that is driven by a desire by the firm to reduce wage costs, may lead to more wage concessions from the labor union, and thus reduce union membership. However, offshoring that is motivated by other factors may have less of an effect on wage negotiations and union density. We test this prediction using data from an offshoring survey run by Statistics Denmark in 2006, 2011, and 2016, that asked firms their motives for offshoring and list wage costs, the quality of inputs, access to specialized technologies, labor shortages, and focusing on core activities as possible explanations.[39] We identify firms that ever indicated that lower wage costs was a very important motivation for offshoring, and link this information to our main dataset using a unique firm-level identifier.

Using firm-level information on offshoring motives is preferable to relying on the income-level of the foreign country to make inferences about wages. For example, offshoring to more developed countries can

[39]The offshoring survey has high response and coverage rates. See Bernard et al. (2020) for more details about the survey.

also be driven by lower wage costs, especially if there is high wage inequality and/or a low minimum wage (i.e. Germany according to Dustmann et al. (2009)). In fact our survey data shows that offshoring to more developed European countries is often motivated by wage savings. Specifically, in 2011 the share of firms that say lower wage costs is a very important motivation is 83% for those offshoring to China, 84% for those offshoring to new-member EU countries, but it is also high at 64% for those offshoring to the EU15 countries.

Table 5 examines whether the motive for offshoring influences the relationship between offshoring and union membership.[40] Specifically in column 2 we see that the threat of offshoring significantly reduces union membership at firms that are motivated by the desire to lower wage costs. The magnitude of this effect is over three times larger than the baseline estimates re-reported in column 1. In contrast, the threat of offshoring has no significant impact on union density at firms that are motivated to offshore for other non-wage reasons (column 3).

Table 5: Offshoring Motives

| Dependent Variable | Worker Union Membership Dummy | | |
|---|---|---|---|
| | Full Sample | Wage Cost Motive | Other Motive |
| | (1) | (2) | (3) |
| Log Offshoring Threat | -0.0038*** | -0.0136*** | 0.0009 |
| | (0.0010) | (0.0019) | (0.0021) |
| Observations | 3,745,655 | 1,778,098 | 523,076 |
| R-squared | 0.8426 | 0.8413 | 0.8381 |
| 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. Column (1) repeats column (3) from Table 2 for comparison, column (2) restricts the sample to firms that cite wage cost motives as a very important driver of offshoring in three surveys (from 2006, 2011 and 2016), and column (3) restricts the sample to firms that do not cite wage cost motives as a very important driver of offshoring in the same surveys. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[40] We have survey data on the firm's motive for offshoring for about two thirds of our sample.

### 3.8 Entry and Exit

This section examines whether entry or exit is driving the offshore-induced decline in the unionization rate. Specifically our findings could be driven by both existing union members being more likely to exit the union and/or non-members being less likely to join the union in response to offshoring.

To test these alternate explanations, Table 6 splits the sample according to whether the worker began the job-spell as a union or non-union member. The findings show that the offshoring threat reduces the likelihood that existing union members remain in the union (column 2). In addition, the offshoring threat also reduces the likelihood that non-union members join the union (column 3). The magnitude of these effects are actually quite similar, although only the former is statistically significant presumably due to the larger sample size. We conclude that offshoring leads to both more union exit and less union entry.

Table 6: Entry and Exit Results

| 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

### 3.9 Firm Characteristics

In Table A7 we show that our findings are robust to the inclusion of a variety of time-varying firm characteristics, including firm sales, firm employment, and the firm's capital to labor ratio. 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.[41] Adding this "Retail Share" control does not change our offshoring results in column 5 of Table A7. In column 6 the offshoring coefficient remains negative and significant after controlling for for-

[41] 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

eign ownership, despite the smaller sample size.[42] Finally, column 7 shows that including the firm's offshoring share of sales has little impact on our results, which confirms that the identifying variation in our offshoring threat variable is coming from firms being differentially exposed to country-product-specific shocks and not from the overall level of offshoring.

# 4 Event Study

This section complements our previous findings by using an alternate event-study empirical approach that tracks workers over time. Specifically, we identify large increases in the firm's threat of offshoring and examine how these shocks affect union membership decisions of workers in subsequent years. We utilize a staggered difference-in-difference (DiD) empirical strategy with two way fixed effects (TWFE), taking care not to use already-treated workers as controls (Callaway and Sant'Anna, 2021; Sun and Abraham, 2021). This empirical approach has two appealing aspects. First, it allows us to examine the dynamic response of union membership decisions to offshoring shocks over a longer time horizon. Second, given the rich nature of our data, it is possible to study the impact of offshoring on the union decisions of not only the workers who remain employed at the firm, but also those who leave the firm.

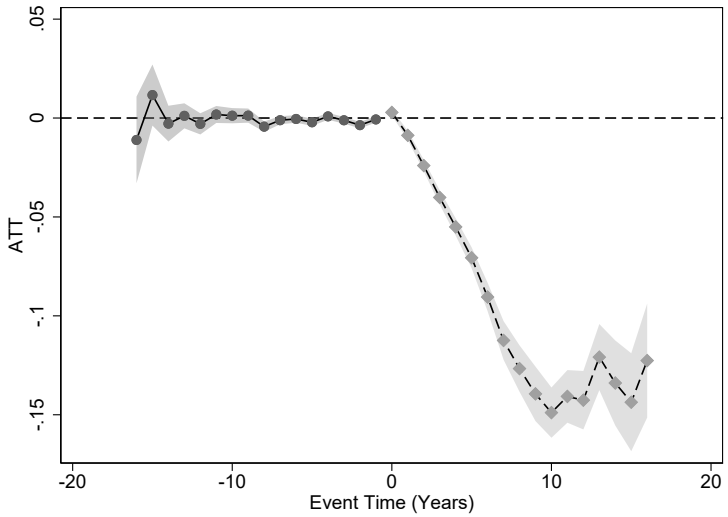
To identify offshoring shocks we first calculate the deviation in the firm's log threat of offshoring relative to the firm-level mean. Then, across all these firm-year observations, treatment is defined as the top ten percent largest positive deviations in the offshoring threat.[43] An important feature of this approach is that we are able to identify large and plausibly exogenous shocks to firm-specific offshoring threats.

The analysis then examines how these offshoring shocks affect workers' union membership decisions over time, relative to the counterfactual group of not-yet-treated workers. This identification strategy exploits variation in the timing of the shock and relies on the assumption that, absent the shock, treated and not-yet-treated workers would have exhibited similar outcomes. Never-treated workers are excluded from the comparison group. We focus on working-age individuals (aged 23-55) in event time $t = 0$, who have sufficient pre- and post-treatment observations.

[42] The inward FATS data used to measure foreign ownership of the firm is only available from 2002 to 2016

[43] The results are robust to defining an offshoring shock as a top quintile increase instead. Note that it is possible for secondary offshoring shocks to follow in subsequent years, but the likelihood of this happening dissipates quickly.

Figure 4: Union Membership Response to Offshoring Shock




Notes: This event study figure shows how union membership responds to large positive shocks in the firm's threat of offshoring.

Figure 4 reports the event study point estimates and 95% confidence intervals. In the years prior to the offshoring threat shock (i.e. before event time $t = 0$), there is no significant difference in the unionization rates of treated and not-yet-treated workers. The lack of pre-trends supports the parallel trends assumption, indicating that the treatment and control groups behave similarly in the absence of the offshoring shock.

However, following the offshoring threat shock in event time $t = 0$, the unionization rates of treated workers decline steadily relative to the control group. After ten years, the unionization rate of workers exposed to the offshoring shock is approximately 15 percentage points lower than that of the control group.[44] This confirms our earlier results that offshoring leads to a significant decline in union membership, and indicates that this effect grows over the subsequent decade.

An added benefit of this empirical approach and the detailed nature of our data, is the ability to examine how the offshoring threat shock affects different types of workers. This provides insight into the underlying mechanisms driving the decline in unionization rates. Specifically, offshoring may cause "stayers" (i.e. workers who continue to work at the same firm) to leave the union, perhaps because the benefits of union membership are eroded by a loss of bargaining power. Alternatively, workers may leave the firm entirely after the offshoring shock and become reemployed in a new firm, occupation, or industry, which could be less unionized. To identify the relative importance of these hypotheses, we track how union decisions evolve for workers who stay at the firm and for those who switch to another firm. To be complete we also include in the analysis workers

[44] As is common in event study analyses, the effects become less precisely estimated many years before and after the event date, although these post-treatment effects remain highly significant.

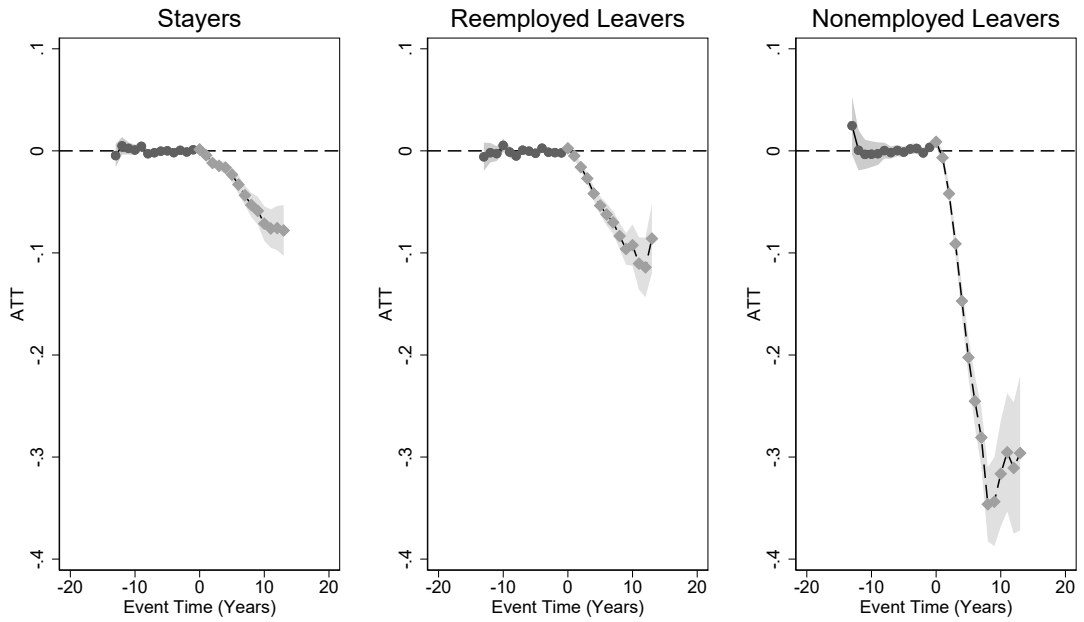
who exit employment altogether.[45]

Figure 5 restricts the sample to these three different types of workers and reports separate events studies for each. In all three panels, the results indicate that treated and control workers are similar prior to treatment, further supporting the parallel trends assumption. However, after the offshoring shock in event time $t = 0$ there is a significant decline in the unionization rates of all three types of exposed workers, relative to the not-yet-treated workers. Specifically, we see in the left panel that the unionization rates of workers who continue to be employed at the same firm (i.e. "stayers") declines by about 8 percentage points in the decade following the offshoring shock. This stayer analysis is conceptually similar to our worker-level results in Table 2, which exploit changes within the employer-employee job spell.[46] In the middle panel, we find that workers who switch to another firm (i.e. "reemployed leavers") have unionization rates that are about 10 percentage points lower ten years after the offshoring shock. This provides evidence that offshoring can also reduce unionization rates via job displacement and changes in the composition of employment. Finally, the right panel shows that workers who leave the firm and are not reemployed elsewhere (i.e. "nonemployed leavers") are much less likely to be union members. This group includes, for instance, retirees and unemployed workers who unsurprisingly are not part of the union. However, it is worth noting that these non-employed workers represent a smaller fraction of the sample (only 14%), whereas stayers and re-employed leavers each account for 43% of the sample.

[45] We define these three groups based on the worker's employment status three years after the offshoring shock, but the results are robust to using other time frames.

[46] However, direct comparisons between these estimates is challenging given the different samples, measures of offshoring, and identification strategies.

Figure 5: Union Membership Response by Type of Workers




Notes: These event study figures show how the unionization rates of different types of workers respond to large positive shocks in the firm's threat of offshoring. "Stayers" are workers who are still employed at the same firm, "reemployed leavers" are workers who left the firm but are reemployed at another firm, and "nonemployed leavers" are workers who left the firm and are not employed elsewhere (definitions based on employment status three years after the shock).

Overall, this event study analysis both corroborates our earlier results that offshoring leads to a decline in the unionization rate and shows that this effect builds in the decade after the offshoring shock. Furthermore, we find that this offshoring-induced decline in unionization rates is driven by both compositional changes in employment as well as within job-spell changes in union membership, and the magnitude of these effects are similar. The within job-spell changes are particularly interesting because they suggest that offshoring may be eroding the union's bargaining power, which we explore in more detail in the next section.

# 5 Union Bargaining Power

The results so far have documented that the offshoring-induced decline in union density is not driven simply by compositional changes in industries, firms, or workers. Thus, a decline in the union's bargaining power remains a possible explanation. Specifically, the threat of offshoring can undermine the union's bargaining power, erode the wage benefits of union membership, and decrease the likelihood that workers are union members. This section uses insights from the standard bargaining model (Abowd and Lemieux, 1993) to guide two additional empirical tests of this hypothesis.

### 5.1 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 share of the firm's rents. The rent-sharing parameter, $\gamma \in [0, 1]$, identifies the fraction of rents that are captured by union workers. To the extent that offshoring weakens the union's bargaining power, then $\gamma$ will be smaller. We use these basic insights from this standard bargaining model to guide our two subsequent empirical approaches.

First, assuming there are positive rents and $\gamma \neq 0$, we see from equation (6) that the union wage will be larger than the non-union wage: $w > x$. We will begin by examining whether there is empirical evidence supporting this union wage premium prediction. Furthermore, if offshoring reduces the bargaining power of the union, then the union wage premium will be smaller at offshoring firms. Our second empirical approach, will measure firm rents and directly estimate the rent-sharing elasticity, $\gamma$. We then will examine whether this rent-sharing coefficient is smaller at firms that can threaten offshoring.

### 5.2 Union Wage Premium

We estimate the union wage premium, using the following Mincerian wage regression:

$$\ln w_{ijt} = \alpha_1 U_{ij} + \alpha_2 \ln OffThreat_{jt} + \alpha_3 U_{ij} \times \ln OffThreat_{jt} + \alpha_4 X_{it} + \gamma_{nt} + \gamma_{rt} + \gamma_{ij} + \varepsilon_{ijt} \tag{7}$$

where $w_{ijt}$ is the hourly wage of worker $i$ at firm $j$ in year $t$, $U_{ij}$ is the binary variable indicating whether worker $i$ at firm $j$ is a union member, and $OffThreat_{jt}$ is the threat of offshoring at firm $j$ in year $t$. We control for time-varying worker characteristics $X_{it}$ (which includes labor market experience, experienced squared, education, and occupation) and we account for industry×year fixed effects ($\gamma_{nt}$), region×year fixed effects ($\gamma_{rt}$), and job-spell worker×firm fixed effects ($\gamma_{ij}$).[47]

If there is a union wage premium, where a union worker earns more than a similar non-union worker, then $\alpha_1 > 0$. However, we know from our earlier findings that offshoring can change a workers' decision to be a union member. To alleviate the possibility that compositional or endogeneity issues are influencing our union

[47] Job-spell fixed effects are replaced with worker fixed effects ($\gamma_i$) and firm fixed effects ($\gamma_j$) in some specifications.

wage premium results, we drop workers that switch into or out of the union.[48] Occasionally non-union members are covered by the collective bargaining agreement, but non-member coverage is typically more relevant for the sector-level wage floors than for the firm-negotiated wage. Furthermore, to the extent that non-members also received the higher union wage, this should attenuate our $\alpha_1$ estimates. Ultimately, however, our goal is to examine whether this union wage premium differs at firms that can threaten to offshore.

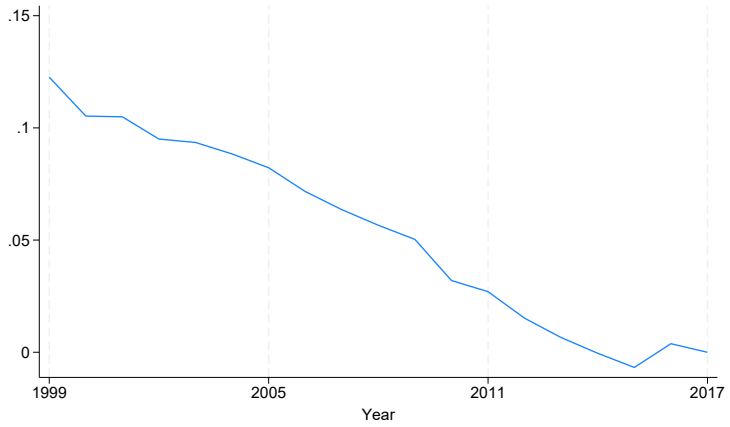
We account for the possibility that offshoring can directly affect wages, of both union and non-union workers, by including the uninteracted offshoring threat variable. While not the focus of this analysis, we note that the sign of $\alpha_2$ can depend on the relative magnitudes of the negative labor supply effect, the negative relative price effect, and the positive productivity effect (Grossman and Rossi-Hansberg, 2008; Ottaviano et al., 2013; Olney, 2012; Ebenstein et al., 2014; Hummels et al., 2014). More importantly for our analysis, we test whether the threat of offshoring disproportionately reduces the union-wage premium, by interacting the union variable with our offshoring threat measure in equation (7). If the firm can credibly threaten offshoring this may undermine the unions' bargaining position and reduce the union-wage relative to the non-union wage. Thus, we anticipate that the union-wage premium will be smaller at firms that can credibly threaten to offshore jobs ($\alpha_3 < 0$).

Before turning to our regression results, we begin by providing evidence on how the union wage premium has evolved over time. We see in Figure 6 that 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).[49] This decline coincides with the relatively rapid rise in the threat of offshoring documented in Figure 1. This descriptive time-series evidence points to an intriguing relationship, which we explore more carefully in our subsequent regression analysis.

[48] Thus, there is no time subscript on the union variable. Alternatively we can include these workers, use a time-varying measure of union membership, and add job-spell-union-membership fixed effects, which generates similar results.

[49] The union wage premium estimates are relative to 2017, and thus the absolute levels of the coefficients in Figure 6 are less meaningful than the trends over time.

Figure 6: Union Wage Premium




Notes: The union wage premium is obtained from regressing wages on a binary union membership variable interacted with year fixed effects and controlling for labor market experience, education, and occupation as well as industry-year, region-year and job spell fixed effects.

Our union wage premium regression results are reported in Table 7. Column 1 begins by including firm fixed effects, as well as the controls, the industry×year fixed effects, and the region×year fixed effects. The results show that union workers earn a 2.7% higher hourly wage than non-union workers, who are otherwise similar in terms of employer, occupation, industry, region, experience, and education. Consistent with the standard bargaining model, we find that there is a union wage premium and it's magnitude is similar to existing evidence from Denmark and France (Hummels et al., 2014; Breda, 2015) and slightly smaller than in Norway and the U.S. (Dodini et al., 2024; Farber et al., 2021).

We also examine whether the union wage premium varies with offshoring, by including in column 1 the offshoring threat variable and the interaction of this variable with union membership. The offshoring coefficient is not statistically significant, perhaps due to the competing offshoring-induced wage effects mentioned earlier. However, more importantly for our purposes, the offshoring threat times union membership interaction coefficient, $\alpha_3$, is negative and statistically significant. An exogenous increase in the firms' ability to threaten offshoring disproportionately reduces union wages compared to the wages of otherwise similar non-union workers. It is worth emphasizing that Table 7 controls for worker characteristics, such as experience, education, and occupation.[50] These findings provide evidence indicating that offshoring reduces the bargaining power of the union and thus decreases the union wage premium.

To account for time-invariant differences across workers, Column 2 also adds worker fixed effects to the specification. This controls for the possibility that union and non-union workers differ in unobserved ways

[50]Furthermore, including offshoring threat×education interaction terms in column 2 ($Off \times Skill$ and $Off \times Union \times Skill$) does not meaningfully change our main $Off \times Union$ coefficient. This indicates that our results are not inadvertently driven by offshoring differentially affecting workers with different education levels.

Table 7: Union Wage Premium Regression

| Dependent Variable | Log Hourly Wage | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Union membership | 0.0266* | | |
| | (0.0148) | | |
| Log Off. Threat | -0.0060 | 0.0049 | 0.0389*** |
| | (0.0057) | (0.0055) | (0.0091) |
| Log Off. Threat × Union Membership | -0.0072*** | -0.0139*** | -0.0511*** |
| | (0.0011) | (0.0023) | (0.0075) |
| Observations | 2,405,554 | 2,288,481 | 2,199,474 |
| R-squared | 0.5300 | 0.8570 | 0.8834 |
| Worker Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | No |
| Worker FE | No | Yes | No |
| Job-spell FE | No | No | Yes |
| 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. Workers switching union membership status are dropped from the sample. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(i.e. ability) which may influence the wages they earn. Given that our sample does not include workers who switch union membership, the inclusion of worker fixed effects subsumes the uninteracted union membership variable. However, it is still possible to examine how changes in the threat of offshoring differentially affect union-worker wages, which is ultimately our focus. Reassuringly, we see in column 2 that the coefficient on the offshoring threat times union membership interaction term remains negative and significant, and is larger in magnitude than the findings in column 1.

Finally, column 3 reports our most rigorous specification, which includes worker×firm job-spell fixed effects. While not the primary focus of this analysis, the coefficient on the uninteracted offshoring variable is now positive and significant. This is consistent with the prediction that offshoring can lead to a cost-savings and productivity-enhancing effect that increases wages (Grossman and Rossi-Hansberg, 2008), and supports results showing that this productivity effect is empirically important (Ottaviano et al., 2013; Olney, 2012; Hummels et al., 2014). Furthermore, this productivity effect is particularly relevant in column 3, because the job-spell fixed effects focuses the analysis on workers who are still employed at the same firm. As a result, the negative 'labor supply effect' where offshoring can lead to worker displacement, is present in columns 1 and 2 but not

column 3. More importantly, the results in column 3 again confirm that the threat of offshoring disproportionately reduces union wages compared to the wages of otherwise similar non-union workers. We conclude from Table 7 that offshoring reduces the union wage premium, this finding is robust to a variety of empirical approaches, and these results are consistent with a decline in the union's bargaining power.

### 5.3 Rent-Sharing

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

$$\ln w_{ijt} = \alpha_1 \ln(rent)_{jt} + \alpha_2 \ln x_{jt} + \alpha_3 OffThreat_j + \alpha_4 \ln(rent)_{jt} \times OffThreat_j + \alpha_5 X_{it} + \gamma_{ij} + \gamma_{nt} + \gamma_{rt} + \varepsilon_{ijt} \tag{8}$$

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 $t$.[51] 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. We also control for worker quality with time-varying worker-level controls in $X_{it}$ (i.e. experience, education, and occupation), and include industry×year fixed effects, region×year fixed effects, and job-spell fixed effects. This basic specification (without the offshoring terms) offers a direct test of Equation (6), with the estimated rent-sharing coefficient ($\alpha_1$) being of particular interest.

We are especially interested in whether the share of rents going to union workers is different at offshoring firms, due to the erosion of union's bargaining power. Our focus in this analysis is on leveraging exogenous changes in firm rents, rather than on the variation over time in offshoring threats. Thus, equation (8) includes a time-invariant offshoring threat binary variable, $OffThreat_j$, and its interaction with firm rents. Specifically, this 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 threat measure will be subsumed by the job-spell fixed effects, while the interaction term will survive and is the focus of this analysis. This allows us to examine whether changes in firm rents over time differentially affect union wages at firms that can threaten offshoring. 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 $\alpha_4 < 0$.[52]

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

[52] 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.

Our empirical approach contributes to the rent-sharing literature in a few important ways. We overcome the data constraints that forced the first and second generation of rent-sharing studies to use industry-level rent measures and/or mean wages (Blanchflower et al., 1996; Abowd and Lemieux, 1993). Instead we exploit the appealing features of our employer-employee matched data to identify firm-level rents and how that affects the wages of individual employees, which is in line with the third generation of studies (Card et al., 2018). Our paper contributes to this most recent literature by accounting for worker heterogeneity and the possibility of worker selection across firms, using job-spell fixed effects and time-varying worker-level controls. Focusing on how changes in firm-level rents affect observably similar workers who remain at the same firm, addresses the issue that high ability workers often sort into more productive firms (Card et al., 2018; Abowd et al., 1999). Finally, very few of these new studies identify exogenous variation in firm rents, which is an important feature of our empirical approach.

Specifically, endogeneity concerns are addressed by identifying changes in firm-level rents driven by exogenous variation in the firm's export opportunities.[53] The idea is that exogenous changes in the foreign importing country alters their demand for particular products, and this will differentially affect Danish firms that exported these product in the presample year. More concretely, a world import demand (WID) instrument 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). Note that this is a conceptually similar approach to our offshoring threat variable, but of course focuses on exogenous variation in firm-level exports and rents. We instrument for both firm rents and the interaction of firm rents with offshoring, using a WID and a WID$\times$Offshoring instrument.

Our rent-sharing results are reported in Table 8. We begin by examining how union wages depend on firm rents in an OLS specification in column 1. The results show a modest positive coefficient on firm rents, but this relationship is not statistically significant. However, the union wage is not surprisingly increasing with the non-union wage at the firm, which indicates that some firms pay their workers more than others (Abowd et al., 1999). 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 A8). 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 evidence from Abowd and Lemieux (1993)), but it is not statistically significant.

[53]This is especially relevant for our sample of relatively large manufacturing firms in a small open economy that tends to trade a lot and this approach is similar to Garin and Silverio (2024) who examine the impact of export demand shocks on wages.

Table 8: 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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 in column 3.[54] The point estimate on our rent measure (of 0.01) shows that at non-offshoring firms, union wages increase with firm rents. However, 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.[55] Reassuringly the rent-sharing estimates in columns 3 and 4 range between 0.01 and 0.10, which is similar to the elasticity of 0.08 typically found in the third generation of rent-sharing studies (Card et al., 2018). More importantly, we see in column 4 that while union wages increase with firm rents at non-offshoring firms, at offshoring firms the rent-sharing elasticity is significantly smaller (-0.08) and the net effect is close to zero.[56] This indicates

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

[55] The first-stage results reported in Appendix Table A8 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.

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

that union workers obtain a smaller fraction of rents at offshoring firms, which again supports the bargaining hypothesis.

While the union-wage premium analysis and the rent-sharing analysis are quite different empirical approaches, the results are consistent. Both sets of findings suggest that offshoring is eroding the bargaining power of the union and thus reducing the wage benefits of union membership. This in turn reduces incentives for workers to join or remain in the union and thus can explain the decline in the unionization rate shown in Section 3.

# 6 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 Danish 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 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.

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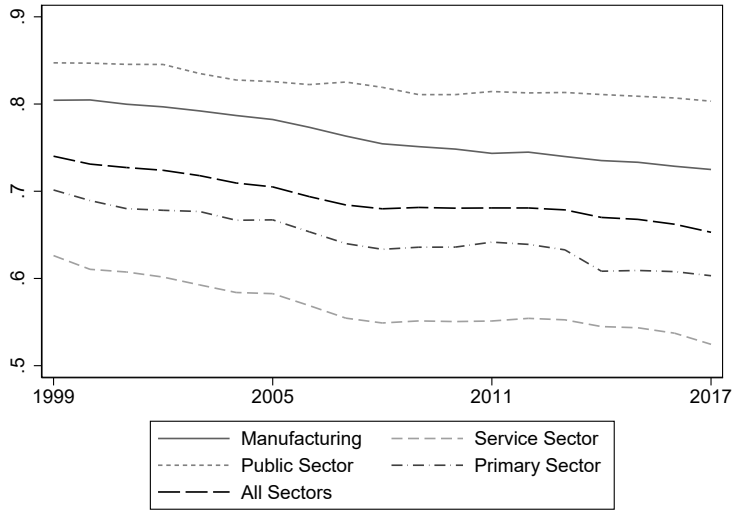
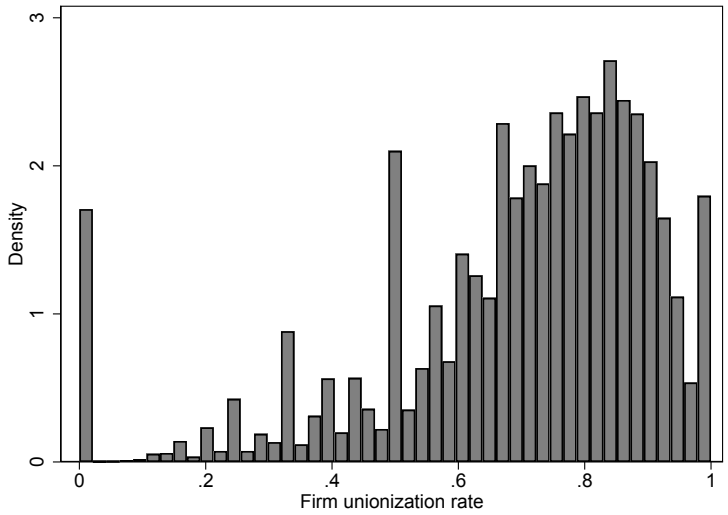
# A Online Appendix Tables and Figures

Figure A.1: The Decline in Unionization Rates Across Sectors




Notes: The unionization rates are calculated for all employees in each sector of the economy.

Figure A.2: Distribution of Firm-Level Unionization Rates




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

Table A1: 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 A2: 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 A3: 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 A4: Sample Restrictions

| | Worker-years | Employment | Sales | Value Added |
|---|---|---|---|---|
| | | Share of Total | | |
| All Manufacturing Workers | 6,011,468 | 1.000 | 1.000 | 1.000 |
| 50+ Employee Firms | 4,361,448 | 0.726 | 0.815 | 0.791 |
| Non-missing Offshoring | 4,155,706 | 0.691 | 0.790 | 0.763 |
| Non-missing Offshoring Threat | 4,042,483 | 0.672 | 0.772 | 0.747 |

Notes: The final sample includes workers in manufacturing firms with at least 50 employees, non-missing offshoring, non-missing offshoring threat and covers the years 1999 to 2017.

Table A5: 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 | 5.24 | 0.31 |
| Female | 3,373,722 | 0.31 | 0.46 |
| Age | 3,373,722 | 41.83 | 10.69 |
| Experience | 3,373,721 | 20.14 | 10.63 |
| High skilled | 3,373,722 | 0.20 | 0.40 |
| | | | |
| *Non-union workers:* | | | |
| Log Hourly Wage | 483,211 | 5.40 | 0.45 |
| Female | 668,761 | 0.36 | 0.48 |
| Age | 668,761 | 39.16 | 11.29 |
| Experience | 668,758 | 15.47 | 11.03 |
| High skilled | 668,761 | 0.44 | 0.50 |

Notes: The sample includes manufacturing firms with at least 50 employees, non-missing offshoring, non-missing offshoring threat and covers the years 1999 to 2017.

Table A6: 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 A7: Firm Characteristics

| Dependent Variable | Worker Union Membership Dummy | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Log Offshoring Threat | -0.0038*** | -0.0027** | -0.0037*** | -0.0032*** | -0.0036*** | -0.0024* | -0.0039*** |
| | (0.0010) | (0.0012) | (0.0010) | (0.0012) | (0.0010) | (0.0014) | (0.0010) |
| 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) | |
| Offshoring Share | | | | | | | 0.0010 |
| | | | | | | | (0.0015) |
| Observations | 3,745,655 | 3,587,693 | 3,745,655 | 3,590,571 | 3,540,894 | 2,930,480 | 3,727,494 |
| R-squared | 0.8426 | 0.8443 | 0.8427 | 0.8446 | 0.8439 | 0.8533 | 0.8425 |
| Job-Spell | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry-Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Year | Yes | 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. The Offshoring Share measures offshoring relative to firm sales. Robust standard errors clustered at the firm-year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Rent-Sharing First Stage

| Dependent Variable | Rent Sharing (1) | Rent Sharing (2) | Rent × Off. Dummy (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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$