

Worker Power and Immigrant Sorting: Impact on Firms, Workers, and Markets

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Abstract

This paper examines the impact of worker power on the sorting of immigrants across firms. It then examines the cascading effects of this sorting on immigrants' economic opportunities, firms' production processes, incumbent workers' careers, and aggregate market efficiency. For identification, we leverage firm-level variation in worker power interacted with an exogenous migration shock stemming from the 2004 EU expansion in a difference-in-differences design. Our findings reveal that worker power constrains firms' ability to adapt to immigrant-driven labor supply shifts – a result consistent across three distinct identification strategies. This sorting dynamic restricts immigrants' opportunities, disrupts firms and incumbent workers, and ultimately lowers aggregate productivity while deepening inequality.

Keywords: Immigration, Worker Power, Unions, Firms

JEL Classification: J2, J3, J5, J6

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1 Introduction

Immigration increases labor supply, raising the quantity and lowering the cost of a critical input in firms' production processes. This can alleviate existing labor input constraints, enabling firms to scale up production and meet growing demand more efficiently. However, increased competition for jobs and downward wage pressure can also generate backlash from workers, particularly at firms where workers have considerable bargaining power. In such firms, workers may leverage their power to impose wage rigidities, increase compensation above market rates, or push for policies that restrict labor supply and protect their own interests. These efforts may constrain firms' ability to take advantage of immigrant shifts in labor supply.

If worker power limits firms' ability to capitalize on immigrant-induced labor supply shifts, variations in worker power across firms could be a key determinant of patterns of immigrant sorting. This sorting may lead to the concentration of immigrants in firms less constrained by worker representation, directly shaping their economic opportunities. Moreover, it could limit firms with substantial worker power from adapting to labor supply shocks, influencing firm behavior and performance. These dynamics may also affect the career trajectories of incumbent workers through changes in firm performance and have implications for broader societal objectives, including efficiency and equity.

Despite the economic and political significance of understanding immigrant labor market sorting and the tendency of immigrants to cluster at specific firms, empirical evidence on the causes and consequences of this phenomenon is lacking. Theoretical work across the social sciences – from political philosophy and sociology to economics – suggests that worker power may restrict immigrant access to firms with high levels of worker power (Bonacich, 1972; Kahn, 1975; Lindbeck and Snower, 1989; Dickens and Lang, 1993). However, this has not been examined empirically. Moreover, these models do not address the subsequent effects of immigrant sorting on firm performance, the careers of incumbent workers, and the overall implications on productivity and equity in society.

This paper offers a comprehensive synthesis of the role worker power plays in sorting immigrants across firms and how this, in turn, affects the economic opportunities of immigrants, the production processes of firms, the careers of incumbent workers, and the productivity of the aggregate market. The main takeaway of our paper is that, by protecting their members, union representation inadvertently constrains firms' ability to capitalize on immigrant-induced labor supply shifts. This not only harms the economic opportunities available to immigrants, but it also negatively affects firms and incumbent workers, ultimately reducing overall productivity in the economy and widening inequality.

To examine the role of worker power in sorting immigrants across firms, we leverage a large

and sudden exogenous shift in migration driven by the eastward expansion of the EU in 2004. This more than doubled the annual inflow of immigrants into Norway and led to the largest wave of migration in the history of the country.¹

The raw data reveals a clear negative relationship between firm-level pre-expansion union density and the rate at which new EU immigrants sort into firms. Observable firm characteristics do not affect this relationship, and a bounding exercise following Oster (2019) suggests that unobservable factors are unlikely to explain it. Importantly, these sorting patterns are not restricted to specific industries but are consistent across the broader Norwegian economy.

To identify the causal impact of worker power on immigrant sorting, we employ three complementary estimation strategies, each leveraging distinct sources of identifying variation and relying on different sets of assumptions. First, we use event-study and differences-in-differences (DiD) designs that examine immigrant sorting across firms with varying levels of union density prior to the exogenous immigrant shock. The findings demonstrate that high pre-determined levels of worker power substantially decrease immigrant sorting to firms. These results are robust to alternative measures of union power, controls for sector and regional trends, profitability, firm size, and synthetic DiD methods (Arkhangelsky et al., 2021). Second, acknowledging that worker power reflects the balance of power between workers and firms, we implement an alternative DiD approach that holds union density constant while varying firm labor market power (Bassier et al., 2022; Dodini et al., 2024a). This approach eliminates any concern related to systematic differences across firms with differing baseline union representation and reinforces our main conclusions, regardless of whether firm power is measured through concentration indices or separation elasticities. Third, we exploit quasi-random variation in union density driven by government-mandated subsidies for union dues between 2002 and 2010 (Barth et al., 2020). These subsidies disproportionately benefited workers with higher pre-existing dues, creating exogenous variation in union membership. Using this variation, we confirm that immigrant sorting patterns are driven by worker power rather than baseline firm characteristics linked to union density. Auxiliary analyses provide support for several stylized facts grounded in Lindbeck and Snower (1989), explaining why immigrants sort into firms with weaker unions and how worker representation constrains firms' ability to hire immigrants.

After analyzing the relationship between worker power and immigrant sorting, we leverage the DiD and event-study framework -- combining baseline rates of firm-level union density with the exogenous shift in migration -- to assess the impact of this sorting on firms and workers. Our use of rich population-wide employer-employee matched panel data enables us to examine the effect of this sorting across all margins of adjustment for firms (labor usage, input substitution and complementarities, production scale-up and productivity, and outputs) and incumbent workers

¹At the same time, the expansion had little influence on the geography of product markets in Norway since the country remained outside the European Union and the European Union Customs Union.

(wages, occupational rank, employment, management responsibilities, and union membership).

Finally, we study the effects of immigrant sorting on aggregate production under alternative patterns of allocation to firms. To do so, we estimate Cobb-Douglas production functions for firms at baseline and use these baseline production functions to estimate aggregate productivity – the sum of productivity in both types of firms – under two alternative scenarios. In one, we study aggregate productivity if the allocation of immigrants had been random across firm types. In another, we study the aggregate productivity if immigrants had sorted to more —rather than less— unionized firms.

We provide four core results. First, we establish that worker power shapes the sorting pattern of immigrants across firms, affecting their labor market opportunities and career prospects. Importantly, the firms that immigrants are pushed into are smaller, pay lower wages, have higher termination rates, weaker job protection, and provide fewer amenities. In other words, worker power pushes immigrants into firms of much lower quality across all dimensions, negatively impacting their economic opportunities upon arrival.

Second, we show that firms’ inability to capitalize on immigrant-induced shifts in labor supply is detrimental to their performance. Specifically, firms with weaker levels of worker power at baseline are able to leverage the immigrant-induced labor supply shift to scale up their production. These firms not only hire more workers and increase their labor shares, but also invest more in materials and capital. As a result of this broad-based scale-up, total revenues rise, and the probability of firm survival increases. In other words, the production scale-up allows firms with weaker worker power to gain a competitive advantage and capture larger shares of both the labor and product markets. While there are no short-term effects on profits, we identify a substantial increase in revenue-capture by leadership (board compensation).²

Third, we show that the sorting effects directly shape the careers of incumbent workers. Specifically, incumbent workers at firms with weak worker power who are able to capitalize on the immigrant supply shock see an increase in their income as well as in their probability of holding a managerial position. This suggests that incumbent workers in less unionized firms manage to capture some of the additional rents generated by their firms and climb the corporate ladder as the firms expand. These results are consistent with recent work on cross-border mobility in Europe (e.g. Foged and Peri, 2016; Beerli et al., 2021), which shows that migration inflows can generate a simultaneous labor demand shift for natives and help them move into managerial roles. Nonetheless, the effects we observe on incumbent workers are relatively small compared to those we see for firms.

²It is important to note that our results are directly dependent on firms being heterogeneous in their ability to exploit the new supply of migrants. Had there been no differential effect across firms in their ability to hire new migrants, we would not see the same production scale-up and market capture effects.

We also find that incumbent workers at firms with weaker worker power at baseline become more likely to join their local union as their firms experience increased exposure to and employment of new immigrants. A large body of literature in economics and political science suggests that native workers fear competition from immigrants (Williamson, 1998), and more recent studies indicate that even when immigrants improve the welfare of native workers, they can still generate backlash (Tabellini, 2020; Medici, 2023). This dynamic has important implications: while increased unionization can improve working conditions in firms with weaker worker representation (Dodini et al., 2023b), it may also reduce firms' flexibility in adapting to future production technology shocks, potentially compromising long-term productivity and even firm survival.

Fourth, we show that the competitive advantage bestowed upon firms with weaker worker power translates into reductions in aggregate productivity and increases in native-immigrant labor market gaps. To study how worker power might shape the effects of immigration on aggregate productivity, we turn to a simple model where we analyze aggregate productivity under alternative scenarios of immigrant sorting across firms. In this exercise, we hold firms production functions constant at baseline, but re-assign immigrants to firms under random sorting and with sorting into more unionized firms. These results show that by holding constant the extent of immigration, re-shuffling immigrants to more unionized firms could increase aggregate productivity by five percent. Additionally, we show that by matching with more unionized firms, immigrant-native wage gaps might be reduced by more than ten percent.

This paper examines the role of worker power in driving the sorting of immigrants across firms, and how that subsequently influences immigrant opportunities, firm production, worker careers, and market-level efficiency and equity. By providing a complete synthesis on the role of worker power in shaping the market effects of immigrants across multiple margins of adjustment, this paper contributes to several strands of research.

First, we contribute to the nascent but rapidly growing literature studying the impact of immigrant workers on firm performance (e.g. Amior and Stuhler, 2024; Mahajan et al., 2024; Mahajan, 2024; Amuedo-Dorantes et al., 2023; Clemens and Lewis, 2022; Doran et al., 2022; Imbert et al., 2022; Dodini et al., 2022a; Beerli et al., 2021; Brinatti and Morales, 2021; Kerr et al., 2015). These papers provide valuable evidence on how immigrants can enhance firm productivity. However, none of these studies explore why some firms utilize immigrant labor while others do not, nor do they examine how these differences affect firm performance, incumbent workers, and aggregate market productivity.

We show that firms with weaker worker power can respond more quickly to immigrant-induced labor supply shifts, allowing them to scale-up production, capture market share, and out-compete more unionized firms. These results have important implications beyond the context of migration. A large number of recent papers show that sudden changes in the price of key production inputs –

whether due to changes in minimum wage policies, energy price hikes, or robotization – can shape firm performance (e.g. Fontagné et al., 2023; Hirvonen et al., 2022; Acemoglu and Restrepo, 2020; Harasztosi and Lindner, 2019). While prior work shows that unions can improve firm performance in relatively stable periods (Dodini et al., 2023b), our results suggest that worker power can reduce firms’ flexibility in responding to sudden shifts in production technology. This is particularly important in the current economic climate, where shocks to production inputs have become more frequent and intense in recent years.

Second, there is a small but fascinating literature examining the role of labor market institutions in explaining the wage and employment effects of immigrants (Foged et al., 2022; Brücker et al., 2014; Bisin et al., 2011; Angrist and Kugler, 2003). These papers provide novel insights on the likely importance of labor market institutions in influencing the impact of migrants on natives, examining cross-country variation in immigration effects from common shocks and interpreting these differences through the lens of variation in labor market institutions. In addition, a small number of novel papers examine the relationship between employer power and immigrant wages (e.g. Hirsch and Jahn, 2015; Naidu et al., 2016; Amior and Manning, 2020). Common among these studies is the conclusion that institutional structures can impact the labor market effects of immigration by altering the competition between incumbents and new entrants.

We contribute to this literature by examining the role of worker power across firms within a country in shaping the allocation of immigrants and how that influences the economy. On the one hand, this is a more narrowly-focused research question. On the other hand, by focusing on worker power across firms —a universal phenomenon —these results are likely to have policy implications that extend beyond national borders. Further, while we measure worker power through union membership, the determinants of worker power may include several factors beyond unions. Various institutional features shape the balance of power in labor markets between firms and workers, and our results provide broad insights regarding the role of such power dynamics in shaping the way in which migrants affect people, firms, and communities.

Third, there is a large literature examining the effect of immigrants on native employment and wages (e.g. Borjas, 1987; Card, 1990; Friedberg, 2001; Borjas, 2003; Ottaviano and Peri, 2012; Foged and Peri, 2016; Dustmann et al., 2016; Friedberg and Hunt, 2018; Piyapromdee, 2021). While these studies provide detailed insights on the likely impact of migrants on natives, most of these studies have estimated average effects through a competitive market framework without considering how the sorting of migrants across firms occurs, and what the consequence of this is for the impact of migrants in a dynamic setting.

Our contribution to this literature is to show that incumbent workers play a key role in the allocation of immigrants across firms, and that this sorting effect has important implications not only for the impact of immigrants on incumbent workers, but also for the impact on firms and the

markets they operate in. By disentangling the interaction between worker power and migration, this paper improves our understanding of how immigrants shape the labor- and product markets of countries they move to and helps explain some of the mixed results on how immigrants affect natives —and firms —that have been found in prior work.

Finally, there is a large and expanding set of studies examining immigrant integration and the mechanisms underlying the native-immigrant labor market gaps more broadly. This includes, but is not limited to, discrimination against immigrants (e.g. Rooth, 2010; Oreopoulos, 2011; Hirsch and Jahn, 2015; Alesina et al., 2018; Sahlström and Silliman, 2024), differential treatment from labor unions (e.g. Dodini et al., 2024b), differential effectiveness of policies and institutions (e.g. Alsan and Yang, 2022), and differences in the skills of immigrants and natives (e.g. Bleakley and Chin, 2004; Albert et al., 2021; Rooth et al., 2023). We show that another important factor influencing the integration of immigrants is the power held by incumbent workers. By leveraging their power to maximize their own payoffs, they inadvertently restrict the options of immigrants and force them to enter specific firms that are of lower quality at baseline. These results help to explain prior research showing that immigrants undermatch to lower quality occupations and firms (Dustmann et al., 2013; Arellano-Bover and San, 2024). Moreover, undermatching to lower quality firms has the potential to not only decrease the initial wages of immigrants, but also may provide fewer opportunities to move up the occupational ladder by learning skills through on-the-job learning.

Our results establish that migration shocks can alleviate labor supply constraints and facilitate production scale-up. However, the overall economic benefits depend on which firms immigrants sort into. In this paper, we show that the ability of firms to respond to immigration-driven input shocks is constrained by worker power. By protecting workers, unions inadvertently limit some of the most productive firms from capitalizing on shifts in immigrant labor shifts, putting them at a competitive disadvantage relative to less unionized firms and increasing their exit rate. This not only harms firms but also negatively impacts incumbent workers and broader societal goals of efficiency and equity. Given the ongoing increase in global migration, rising firm labor market power, and recent uptick in union activity, it is crucial to develop policies that protect workers while providing firms the flexibility to adapt to changing economic conditions. While this paper focuses on worker power and immigration, it is important to note that these dynamics likely extend to firms' ability to adapt to shifts in other factors of production as well. Understanding these additional drivers is crucial for designing efficient labor market policies and integration initiatives.

2 Background

2.1 Immigration in Norway

Global migration has increased dramatically over the past several decades, from 95 million in 1970 to 285 million in 2020 (McAuliffe and Khadria, 2019). The rapid growth in international migration is particularly noticeable across the OECD, in which more than 15 percent of the overall workforce now consists of migrants (Figure A.1).

Norway has seen similar developments over the past several decades, moving from a homogeneous society with only 57,000 migrants in 1970 (1.5 percent of the overall population) to a heterogeneous society with a substantial immigrant base of 711,000 individuals in 2020 (14.5 percent of the overall population). Approximately 50 percent of the immigrants in Norway have a Western background, and the seven most common immigrant countries are Poland (97,197), Lithuania (37,638), Sweden (36,315), Somalia (28,696), Germany (24,601), Iraq (22,493), and Syria (20,823). The immigrants are spread across the country, though there are particularly large immigrant clusters in the metropolitan areas of Oslo, Bergen, Stavanger, and Trondheim. Similar to other Scandinavia countries, there is a non-negligible degree of residential segregation in the country, but this has declined substantially over the past two decades (Kornstad et al., 2018).

2.2 The 2004 European Union Enlargement

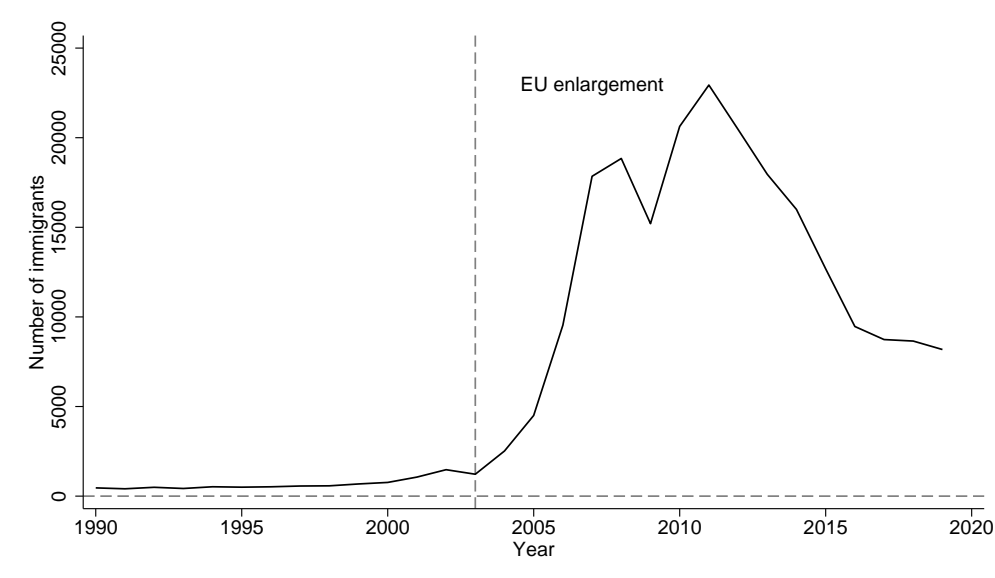
Following a national referendum in 1994, Norway voted to remain outside the European Union. However, Norway has been a member of the European Free Trade Area (EFTA) since its inception in 1960 (currently consisting only of Iceland, Liechtenstein, Norway, and Switzerland). Through the Agreement on the European Economic Area (1994), the European Union's single market is extended to the EFTA (with the exception of Switzerland) as a single market governed by a common set of rules. EFTA members that are part of the EEA Agreement participate in the EU's internal market without being members of the EU or the European Union Customs Union. Importantly, these rules enable free movement of persons, including the freedom to choose residence in any country. As a result, members of countries in the European Union can freely enter Norway to live and/or work.

In 2004, the European Union expanded to include ten new member states —Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia. Through a decision Norway had little power over (since they are not part of the EU and do not have formal access to the EU decision-making process), workers from these countries were allowed to enter Norway to work and live. At the same time, since Norway remained outside the European Union and the European Union Customs Union, the EU enlargement had little impact on the geography of

product markets.³

The eastward expansion of the EU generated a sharp and dramatic increase in the inflow of migrants to Norway (Figure 1). In what became the largest immigration shock in the history of Norway, almost 100,000 workers from Poland alone entered Norway in the years that followed. In comparison, the later expansion of the European Union in 2007 – this time including Bulgaria and Romania – had a much smaller impact on immigration to Norway.⁴ As shown in Figure A.2, immigrants from the new accession countries are spread across the country.⁵

Figure 1: Annual immigrants from EU 2004 accession countries



Notes: This figure shows that the number of annual immigrants from the ten countries admitted to the European Union in 2004 (Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) was close to zero prior to the enlargement of the European Union, but grew dramatically in the years that followed, reaching nearly 20,000 immigrants annually.

³Between 2005 and 2009, a temporary transitional restriction required workers from these countries (except Malta and Cyprus) to hold a residency permit to work in Norway. This permit was granted to all who received a formal job offer from a Norwegian employer. The restriction was aimed at preventing strain on Norway’s social welfare system. Evaluations show it had a negligible effect on migration flows. For more information, please see: <https://www.eurofound.europa.eu/en/resources/article/2004/transitional-arrangements-introduced-free-movement-workers-new-eu-member>.

⁴The short-term effects of immigration on wages in the construction sector following the 2004 EU enlargement are studied by Bratsberg and Raaum (2012) in Norway and Kuosmanen and Meriläinen (2022) in Finland.

⁵See Dorn and Zweimüller (2021) for a discussion of the economics of migration in the European Union more broadly, and how the 2004 EU enlargement radically changed the reasons for labor-based migration in Europe.

2.3 Unions in Norway

Unions and collective bargaining are central to Norway's labor market, and all workers have the legal right to join a union irrespective of which firm they work at.⁶ However, this has to be done on a volunteer basis; closed shop union agreements are not legal.

The rules and regulations governing unions are anchored in the Norwegian Working Environment Act, which oversees worker rights and regulates both individual employees and their contracts as well as unions and their collective bargaining agreements. The stated goals of the unions are to protect their members and improve their working conditions through bargaining. This does not only pertain to the wages of workers, but also to decisions related to the work environment, employment protection, and non-pecuniary benefits. Should negotiations between employers and employees fail, unions have the ability (and legal right) to engage in industrial action and strikes.

Bargaining between the firm and the union typically takes place both at the national level as well as the local level, and can most aptly be described as a two-step process. In the first step, nation-wide sectoral collective bargaining agreements are established to set wage floors. These agreements are renegotiated every 2-4 years. Following the sectoral bargaining, local negotiations take place between the employer and the union. These local negotiations typically take place every year, and non-union workers are excluded from these negotiations. Over the past two decades, local negotiations have come to represent the most important part of the bargaining process, accounting for more than 70 percent of total negotiated wage increases (Bhuller et al., 2022). Thus, even though the Norwegian labor market is characterized by a high coverage of collective bargaining agreements, the ability of firms and local unions to adjust individual wages and work conditions is very high.⁷ In this sense, the system is relatively similar to that in countries such as Denmark, Sweden, and the UK, where unions also balance centralized negotiation with localized flexibility (Dahl et al., 2013; Bhuller et al., 2022, e.g.).

In addition to participating in the annual local bargaining process, unions often play an active role in hiring and firing decisions within firms. They provide input on job advertisements and interview questions, often sit in on interviews, and are typically required to approve wage offers extended to candidates. Moreover, they play a key role in workforce reductions and terminations by offering exclusive mediation and legal support to workers who are members of the union.

The extent to which unions wield power in the bargaining process is a direct function of the union density at the workplace (Dodini et al., 2021). This is not only because a stronger union has more leverage in the negotiations (a threat of strike encompassing 90 percent of the workforce

⁶For prior work in economics on the role of unions in Norway, see, for example, Barth et al. (2012) and Dodini et al. (2023a).

⁷For a more detailed discussion on the institutional details surrounding the wage bargaining process, see Dodini et al. (2022b).

generates more leverage than the threat of a strike encompassing 10 percent of the workforce) and more resources to use during the negotiations, but also because of the institutional details in the Norwegian setting. Specifically, in Norway, employers are legally obligated to recognize and negotiate with local unions if they are present at the workplace, irrespective of the number of members it has. Hence, in contrast to the private sector in the US in which firm unionization requires a majority support through a union election, and in contrast to Germany in which a firm either is covered by a union agreement or not, unions can operate in Norwegian workplaces as long as there is a non-zero support for the union.⁸

Given the institutional structure surrounding collective bargaining in Norway, establishment-level union density is commonly interpreted as a continuous measure of worker power, making this a particularly useful context for our analysis.⁹

2.4 Conceptual framework and predictions

Historically, labor unions were established to counteract the power of firms through the monopolization of labor supply. By restricting the supply of workers to firms, unions can raise the wages of workers and advance the interests of their members (Robinson, 1969; Freeman and Medoff, 1984).

By increasing labor supply, augmenting worker competition, and putting downward pressure on wages, immigrants pose a direct threat to these goals (Bonacich, 1972). Accordingly, organizations such as the American Federation of Labor openly supported direct restrictions on immigration as a way to protect their members (Briggs, 2001; Fine and Tichenor, 2009). These observations come through in the data as well, with researchers in sociology and political science observing that places with stronger trade unions oftentimes are associated with worse labor market outcomes for immigrants (Avci and McDonald, 2000; Penninx and Roosblad, 2000; Gorodzeisky and Richards, 2013; Marino et al., 2015; Boräng et al., 2020).

The dynamics described above, whereby incumbent workers advance their own interest at the potential detriment of new entrants, are captured well by the canonical insider-outside model first conceptualized by Lindbeck and Snower nearly four decades ago (Lindbeck and Snower, 1989, 2001).¹⁰ However, the same dynamics can be generated by any theory whereby some firms experi-

⁸In addition, non-union workers are automatically excluded from local union negotiations, and there are substantial private goods components associated with union membership in Norway (Dodini et al., 2023a), further implying that the influence of unions grow as a function of their membership base.

⁹Our decision to focus on a continuous measure of union density is also supported by on the canonical work of Freeman and Medoff (1984), which shows that what matters for successful union bargaining is not whether a union is present at the firm, but how large the union is at the firm. A union with very little coverage will have negligible leverage over the firm if negotiations break down and threat of adverse action such as a slowdown or walkout is minimal. A union with universal coverage, on the other hand, will have substantial leverage as any adverse action would have considerable consequences for the productivity and revenue of the firm (e.g. Breda, 2015; Fitzenberger et al., 2013; Barth et al., 2000; Balsvik and Sæthre, 2014; Barth et al., 2020).

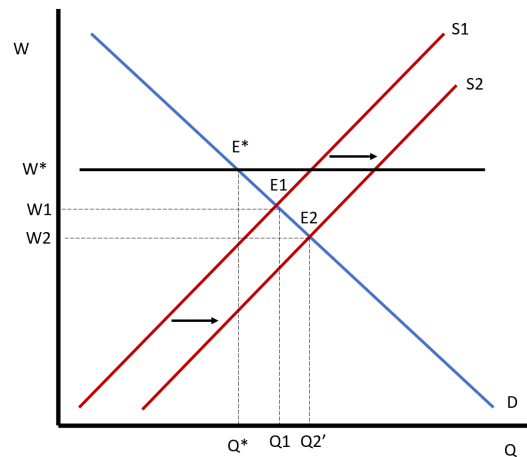
¹⁰In fact, while not explicitly concerned with labor unions or immigrants, (Lindbeck and Snower, 1989) use unions

ence non-zero turnover costs, whether due to split labor markets (Bonacich, 1972) or labor market segmentation (Kahn, 1975; Dickens and Lang, 1993).

Consider a firm with high levels of worker representation (i.e., insiders). Firms facing non-zero turnover costs have incentives to engage in bargain and offer concessions to workers, raising their compensation above market levels and increasing downward wage rigidity (see W^* instead of $W1$ in Figure 2). These turnover costs can arise from various factors, such as hiring and firing costs, firm-specific human capital, or the risk of industrial action.

When there are shifts in market-level labor supply (e.g., $S1$ to $S2$ in Figure 2), for example due to a migration shock, firms that provide compensation above equilibrium levels *or* face downwardly rigid wages may struggle to quickly adjust to changes in input prices and hire immigrants (i.e., outsiders). In contrast, firms with lower levels of worker representation may face fewer obstacles in hiring workers at the new equilibrium compensation levels ($W2$ in Figure 2). This model predicts that firms with higher levels of worker representation, therefore, may face greater constraints in hiring immigrants compared to firms with lower levels of worker power.

Figure 2: Firm responses to shifts in labor supply when faced with high turnover costs



Notes: This figure illustrates a prediction from Lindbeck and Snower (1989, 2001), whereby above market-level wages of firms with high turnover costs may prevent them from hiring new workers at new wage levels when faced with shifts in the labor supply.

Firms with weaker worker representation that are able to take advantage of the supply shock may be able to do so to adjust their input mix, scale up production, increase their market shares on both the labor- and product side, increase revenues, and gain a competitive advantage over firms with insiders. In addition to influencing the structure of competition between firms, this may also

as an example of insiders and minorities as an example of outsiders, but they never combine them.

benefit incumbent workers at firms with less worker power. Specifically, as shown in recent work on cross-border commuting in Europe (e.g. Beerli et al., 2021), this initial immigrant-induced labor supply shift may generate a subsequent rightward shift in the demand for labor in Figure 2) – either due to labor complementarities between natives and immigrants in production (e.g. Dustmann et al., 2016) or due to immigrants being hired into lower positions within the firm and thereby generating a need for additional natives higher up the corporate ladder (e.g. Beerli et al., 2021). Depending on the magnitude of this subsequent shift, the long-term effects of immigration shocks on incumbent workers in firms with weaker representation are ambiguous.

In contrast, firms with high levels of worker power may lose out due to their inability to take advantage of the shift in labor supply. To the extent that firms with high levels of worker power are no longer competitive, a long-run implication of migration-induced labor supply shifts is firms exiting the market altogether. This implies that union power, which typically improves the working conditions of members, may backfire in settings with sudden labor supply shocks.

3 Data

Our primary data come from the central population registers at Statistics Norway, which provide annual demographic and socioeconomic information on all individuals for each year between 2000 and 2011 (Statistics Norway, 2019a). This includes information on gender, age, and primary residency location. By linking the individual-level data to the migration register (Statistics Norway, 2021), we collect information on every individual’s immigration background (if they are immigrants, which country they migrated from, and when they migrated). By linking these data to the union dues database (Statistics Norway, 2019b), we further collect information on all workers’ union status for each year over our sample period.

We merge the individual data to detailed employer-employee matched data and firm tax data. These data include information on the firm’s inputs (capital, materials, labor, and machines), workforce (size, hours, and earnings), and outputs (sales revenue, profits, board compensation, and survival). These data also enable us to construct proxy measures of productivity (worker fixed effects based on bias-adjusted AKM models as well as revenue per worker hour) and firms’ labor- as well as product market shares.¹¹ Combined, these data provide us with detailed information on the operations of firms and enable us to directly link the migration flows to the performance of the firms in the economy.

To avoid issues arising from how to define zeros when using log-based measures of outcomes,

¹¹Labor market shares are calculated as the firm’s share of total employment in the local labor market (akin to commuting zones and constructed by Statistics Norway to generate more aggregate markets; there are 160 in the country) and 3-digit occupation. Product market shares are calculated as the firm’s share of total sales revenue in the local labor market and industry.

we follow Chen and Roth (2024) and define most outcomes as a percent of their levels at baseline. However, we deviate from this practice in three instances. First, since there were almost no immigrants from EU 2004 countries in Norway at baseline, this outcome is measured as the percent of the firms' workers from EU 2004 enlargement countries.¹² Second, we study how immigrant sorting affects the composition of workers in firms as measured through mean worker fixed effects. These measures follow existing work and are the firm mean of estimates of worker effects from bias-adjusted AKM models based on data in the pre- and post- periods (Abowd et al., 1999; Bonhomme et al., 2023). Third, firm survival is coded as a binary indicator variable.

Once we have obtained detailed information on immigration status and union membership of workers, and merged these data to the firm-level tax and accounting data, we link our data to a series of education, income, organizational role, and tax registries at the individual level (Statistics Norway, 2018a,b, 2012, 2014). These registers provide detailed information on each individual's education level, income, occupation, industry, and management roles (if any). We use these data to examine the impact of migrants on incumbent workers (employment, income, promotions, managerial responsibilities, occupational ranking, and union status). To measure income, we use annual population income ranks (0-1), which are stable in the presence of outliers (Nybom and Stuhler, 2017) and avoid issues relating to how we code zeros (Chen and Roth, 2024). To measure occupational rank, we use the mean income rank in each occupation. An individual's status as a manager, their employment status, or whether they have changed firms, are all outcomes measured using binary indicator variables.

In our main specifications, we restrict attention to private sector firms that employed a minimum of 15 workers in 2000 and existed through 2003 (the year before the EU expansion took place). This approach ensures that we have a set of firms to track for a sufficient number of years before the 2004 EU enlargement. It also prevents the effects from being estimated based on small firms with minimal impact on the aggregate economy. As a result, we are left with approximately 9,000 firms and nearly 400,000 workers.

Finally, to better understand how immigrants and natives value workplace characteristics and how they perceive unions to shape these characteristics, we use recently collected survey data from Dodini et al. (2024b). The survey targets 5,200 union members and asks a battery of questions. We use results from two of these questions in this paper: (1) which job characteristics that workers value (wages, job security, promotion potential, and work environment), and (2) the extent to which

¹²Since the share of immigrants from EU 2004 accession countries is a function of firm size, we also define EU 2004 share based on firm-size at baseline to test for sensitivity in how we define these variables. When we use this measure, the magnitude of our estimates increase (Table A.3, Panel C). However, because the range of possible values the outcome variable take when we change the denominator for firm size is no longer restricted to be between zero and one, these estimates are slightly noisier. We prefer the simple measure based on the share of a firms workers who are from EU 2004 enlargement countries each year.

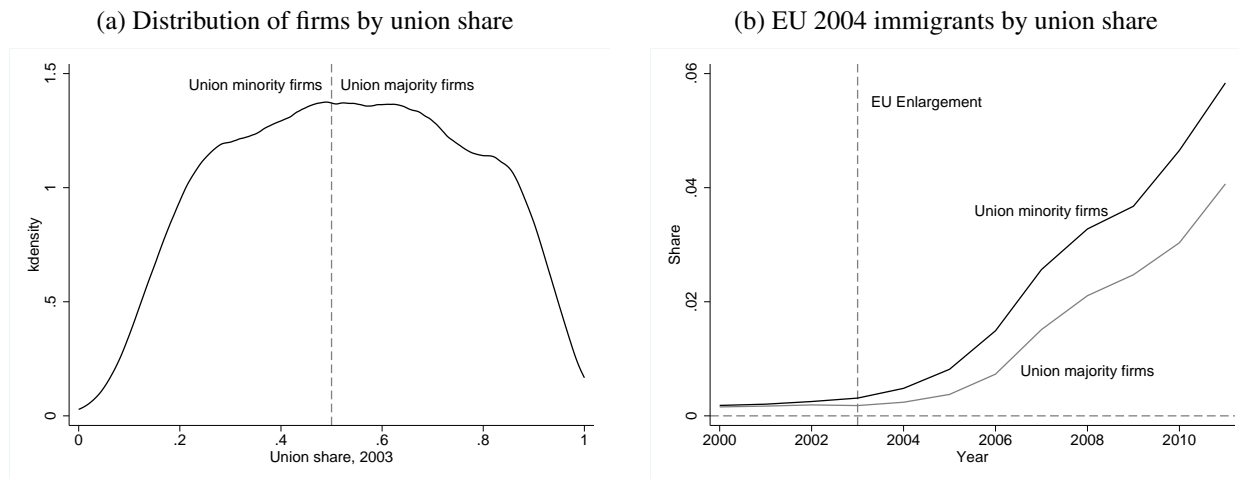
they believe unions are capable of improving work conditions across these four dimensions.

4 Worker power and immigrant opportunities

How does worker power shape the pattern by which immigrants sort across firms? The predictions outlined in Section 2.4 suggest that immigrants may sort into firms with weaker worker representation.

To study the evolution of immigrant sorting over time across firms that vary in worker representation, we first plot the distribution of union density across firms and then classify firms based on whether their union density was above or below 50 percent in the year prior to the immigration shock (Figure 3a). Next, we plot the share of these firms workforce that comes from EU 2004 countries over time, tracking changes in the composition of their employees following the enlargement (Figure 3b).¹³ Seven years after the EU expansion, the share of EU 2004 immigrants in union minority firms is nearly 50 percent higher than in union majority firms. The disproportionate sorting of immigrants to firms with weaker worker power *prior* to the shock provides strong evidence that worker power shapes immigrant sorting across firms at the time of arrival.

Figure 3: Worker power and EU 2004 accession country immigrants over time



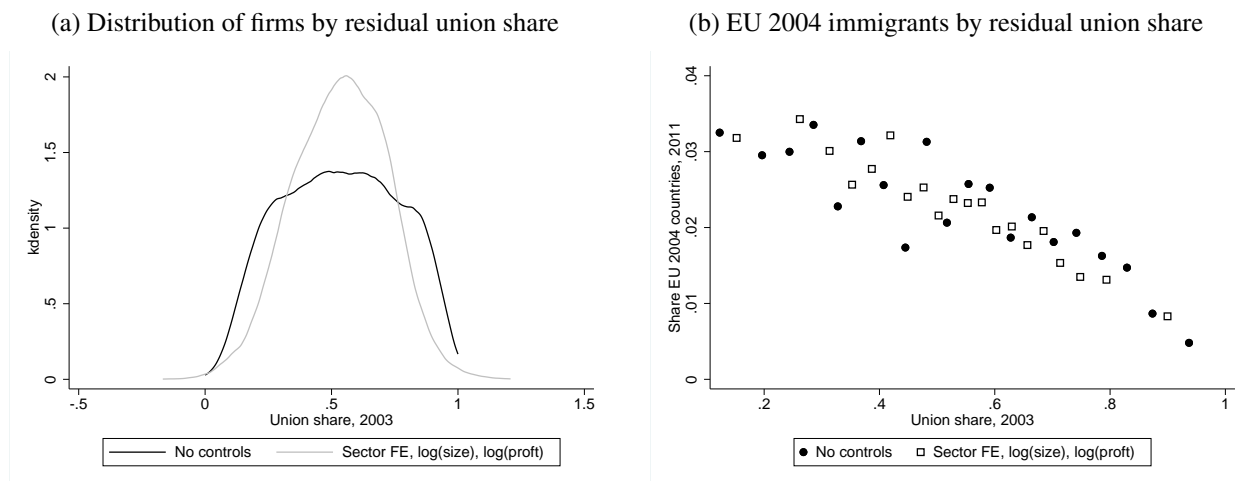
Notes: Figure (a) shows the distribution of firms by 2003 union share, with a dashed line indicating whether half the workers in a firm are union members. Figure (b) shows the share of workers at union minority and union majority firms who were born in the set of countries admitted to the European Union in 2004 as a result of their enlargement.

Of course, firms with more or less worker power prior to the shock differ from one another.

¹³We binarize the worker power variable to simplify the estimation and interpretation. Results remain consistent when using a continuous measure of worker power. We discuss this below and show those results in the Online Appendix.

Specifically, Table A.1 shows that firms with stronger union representation are larger, more profitable, and operate in more profitable sectors (in the base year). However, Figure 4a demonstrates that most of the variation in worker power across firms remains even after conditioning on these factors, and Figure 4b reveals that the strong linear relationship between baseline worker power and immigrant sorting only gets stronger once we residualize on sector, firm size, and profitability. In other words, observable characteristics of firms do not affect the relationship between worker representation and immigrant sorting. To test for the extent that unobservable differences between firms unrelated to worker power might explain the result, we conduct bounding exercises from Oster (2019) in Table A.2. The results suggest that unobservable differences between firms must be 17 times more influential than firm size or profitability in determining worker sorting patterns to firms with lower union power for this relationship to vanish. While directly interpreting this number is challenging, existing research typically identifies firm size and profitability as key predictors of union density, making it unlikely that unobservable differences would have such a disproportionate effect (Løken et al., 2013).

Figure 4: Immigrant sorting across firms which vary in worker power at baseline



Notes: Figure (a) shows the variation in union density across all firms, and leftover variation in union density conditional on sector, firm size, and profitability. Figure (b) plots the 2003 share of workers in each firm against the 2011 firm-level share of workers from 2004 EU enlargement countries as well against the residualized union share, after controlling for sector fixed effects, firm size, and profitability.

To better isolate the causal impact of worker power on immigrant sorting, we impose more structure and leverage three distinct yet complementary identification strategies, each exploiting different sources of variation and relying on independent sets of assumptions. While the parameters identified in each approach differ slightly, all of them address the same question from different angles. This enables us to mitigate concerns related to any single approach and provide a more

comprehensive understanding of how worker power influences immigrant sorting across firms.

First, we use event study and differences-in-differences (DiD) designs to analyze immigrant sorting across firms with varying union density rates before the exogenous immigrant shock, controlling for firm and sector-by-year fixed effects. These specifications allow us to compare the evolution of outcomes across firms (within sectors) with higher or lower worker power in the year before the policy enactment. By using worker power measured prior to the reform, we remove the potential endogenous effect of the shock on firm-level union density. We augment this approach with a synthetic differences-in-differences (Arkhangelsky et al., 2021) design, which extends the synthetic control method (Abadie et al., 2010) to a DiD framework. This method constructs a more accurate counterfactual (the synthetic control) through a data-driven process and uses it in the DiD framework, helping to address any remaining concerns related to unobserved confounders. Broadly, this is our preferred approach, offering a clear identification strategy with a straightforward interpretation related to worker power.

Second, we recognize that worker power depends not on worker representation but rather on the balance of power between workers and firms. As such, for a given level of union density, workers will have less bargaining power in concentrated labor markets where firms hold substantial power. We should therefore see immigrants conditional on union density sorting into more concentrated markets. The strength of this method lies in holding union density constant across firms, eliminating the risk that unobserved differences in union density across firms drive our results.

To implement this, we leverage a difference-in-differences approach that holds worker power constant while varying pre-shock firm labor market power. We measure firm labor market power using both traditional concentration indices and separation elasticities (Bassier et al., 2022; Dodini et al., 2024a). While this approach assumes no unobserved confounders across firms with varying levels of market power, the assumption is distinct from that in our main approach. For an unobserved confounder to drive the relationship we uncover through our two first approaches, it would need to operate across firms with different union densities within sectors, driving worker sorting, and also be systematically different across firms with the same union density but varying levels of firm labor market power.

Third, we abstract away from baseline differences in unionization and exploit only quasi-random variation in union density. The quasi-random variation in firm-level unionization comes from exogenous and differential changes in the cost of union membership across firms.¹⁴ These price changes are driven by national government-mandated subsidies for union dues implemented between 2002 and 2010. The maximum tax deduction for union dues increased by more than 300

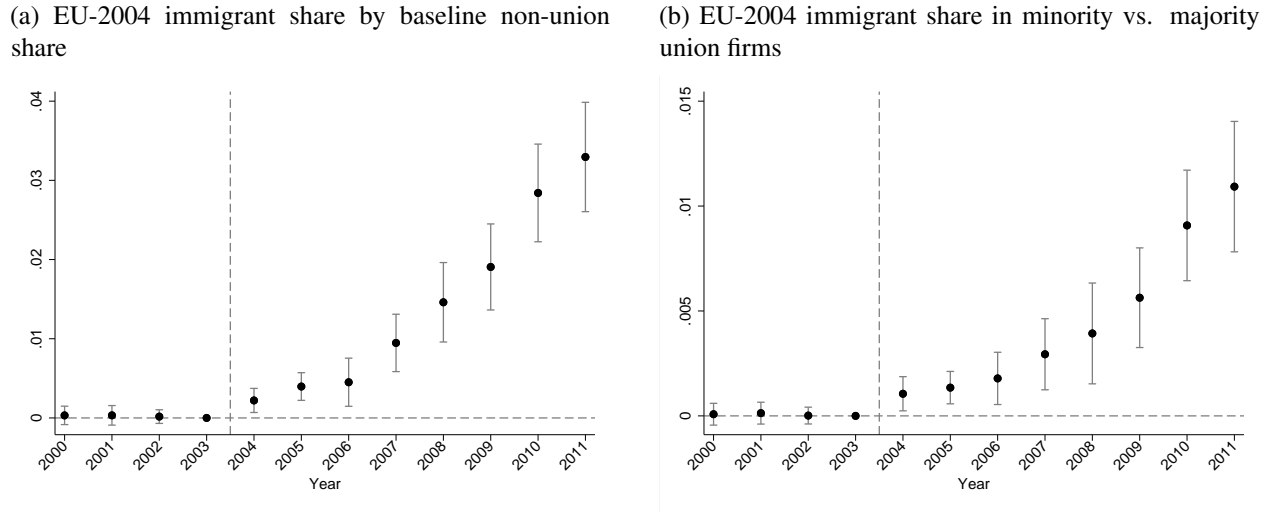
¹⁴Assuming that union membership is a normal good, a decrease in the price of membership should lead to an increase in the quantity demanded. Consequently, individuals who were not previously union members will be more likely to join a union following these price changes as the net cost of enrollment declines.

percent during this time period. A particularly interesting feature of this subsidy policy is that it only reduced the membership price for workers whose union dues were high enough that their deductions were previously bounded by the tax deduction cap, while it had no impact on workers whose union dues were below the deduction cap. As such, individuals at firms subject to higher union dues before 2002 could expect a substantial increase in these subsidies compared to individuals at firms with lower union dues. Versions of our instrument have been used in prior research and its validity for generating exogenous variation in union membership is well-established. We apply this method simply to confirm that the sorting patterns of immigrants across firms that we uncover are driven by variation in worker power and not by unobserved confounders.

Results from the first approach are provided in Figure 5, and offer clear evidence that worker power prevents firms from hiring new immigrants, pushing them to take up jobs at union-minority firms. Importantly, these event study estimates provide strong support for the common trends assumption, with no indication of pre-treatment trends that differentially affect firms with varying baseline union densities prior to the shock. This result holds whether we measure baseline worker power through a simple binary variable (Table A.3, Columns 1-5) or if we exploit the entire spectrum of worker power through a continuous variable (Table A.3, Columns 6-9). While we have more power and obtain similar results when relying on the continuous measure of union power, we prefer the binary measure of baseline union power for simplicity. Further, we show that these patterns are not driven by geographic sorting (Table A.3, columns 4 and 9). These conventional differences-in-differences results are corroborated with those from our synthetic difference-in-differences approach (Column 5 of Table A.3), which employs a data-driven process to create a counterfactual control group. This reinforces the argument that differences in worker power across firms play a significant role in immigrant sorting. To address the possibility that our results are driven by either sectoral or geographic migration patterns, we also show that differences in union density within granular sector-by-geography-by-year cells are predictive of the firms immigrants sort into (Figure A.4).¹⁵

¹⁵We also study whether patterns of immigration in prior periods explain the sorting of immigrants to labor markets and firms following the 2004 EU enlargement. Since there were almost no immigrants from 2004 accession countries in Norway prior to 2004 (Figure A.2a), contacts with prior immigrants from the same communities are unlikely to explain the later patterns of immigration (Figure A.2b). We also test for this more formally by using a shift-share instrument (Goldsmith-Pinkham et al., 2020). The results from this exercise show that despite their very low levels, the share of pre-2004 immigrants in local labor markets (defined by geography and sector) played a minor role in the very first waves of immigration after 2004. This is likely simply because the first waves of immigrants moved to cities. Nonetheless, later waves of immigrants quickly diffused throughout Norway (Figure A.7a) and baseline immigrant shares have little explanatory power over later moves. Finally, we study whether immigrants from 2004 accession countries sort into firms which simply had more contact with immigrants (from any country) prior to 2004. Again, our results show that while the very first waves of immigrants may have sorted into firms employing other immigrants, later waves of firms diffused into the economy more broadly (Figure A.7b).

Figure 5: Event-study estimates of immigrant sorting to less unionized firms



Notes: Figure (a) makes use of the full variation in baseline rates of union membership to study immigrant sorting using an event-study specification. The results in 2011 are the event study analog for Figure 3b. Figure (b) reports the difference in the share of workers from EU 2004 accession countries between firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 1.

Results from the second empirical approach, in which we hold union density constant and leverage variation in firm power, are shown in Table 1. Our findings show that the sorting of immigrants into low-union firms is considerably more pronounced in firms with greater labor market power. This aligns with the findings from our initial approach and provides additional support for worker power playing a significant role in sorting immigrants across firms. Importantly, this approach – though it identifies a different parameter – addresses potential concerns about unobserved factors correlated with union density, as union density is held constant across firms in this analysis.¹⁶

In our third empirical approach, we exploit quasi-random variation in union density and combine this with the immigration shift to examine immigrant sorting across firms who experience different exogenous shifts in union density. Our findings are shown in Table A.7 and demonstrate that immigrants considerably more exposed to the union dues reductions see a significantly larger increase in union density. In addition, these firms also see a substantially lower increase in the share of their workforce coming from the EU 2004 ascension countries. Thus, not only do baseline differences in worker power drive immigrant sorting, but so does exogenous shifts in worker power, helping us rule out concerns related to potential confounders.

¹⁶An alternative way of interpreting this interaction between union power and firm labor market power is by acknowledging that firms with market power will be better positioned to yield concessions to strong unions due to the presence of supernormal profits and quasi-rents. Consequently, we should see a greater gap in immigrant sorting across union majority and union minority firms in more concentrated markets relative to less concentrated markets. Both of these interpretations are consistent with the conceptual framework and our core results.

Together, the sorting pattern identified across all three empirical approaches employed in this section aligns well with the conceptual model in Section 2.4. This dynamic is not confined to the canonical insider-outsider model (Lindbeck and Snower, 1989, 2001), but extends to any theory whereby some firms experience higher turnover costs, whether due to split labor markets (Bonacich, 1972) or labor market segmentation (Kahn, 1975; Dickens and Lang, 1993). In these situations, workers with substantial power may be able to push their wages above the equilibrium, restricting labor supply and limiting the available positions for new entrants. Additionally, such power may also restrict firms from offering low and differentiated wages to immigrants due to locally negotiated wage contracts.

To empirically investigate *why* immigrants sort into firms with weaker worker power and *how* worker representation might constrain firms' abilities to hire immigrants, we examine empirical support for several predictions from the conceptual framework in Section 2.4. Several stylized facts support the idea that high turnover costs and above-market wages, driven by strong worker power, may limit firms' ability to capitalize on labor supply shifts. First, the variance in wages is much higher in firms with weak worker power (Table A.1), suggesting that these firms have more flexibility in setting differentiated wages when they are unencumbered by worker representation. Second, when new immigrants are hired, firms with weaker worker power pay lower wages (Table A.4) near the very minimum of their pay range (in the same occupation and year), while firms with stronger unions pay immigrants substantially higher wages (Figure A.5). Third, immigrants are undermatched to worse firms relative to their observable characteristics, suggesting that frictions may prevent them from entering firms that better match their skill levels (Table A.5). Fourth, since unionized firms pay higher wages to the immigrants they do hire, discrimination is unlikely to explain these patterns (Table A.6). Fifth, a large-scale field survey shows no significant differences in preferences for job attributes between immigrants and natives (Figure A.6).

Collectively, these findings suggest that firms with limited worker power are uniquely positioned to capitalize on the inflow of new migrants, utilizing them to enhance their own production. In contrast, firms with greater worker power are constrained in their ability to do so. This sorting pattern carries profound implications for immigrants' long-term success within Norway's labor market. As we show in Table A.1, firms with lower union representation consistently perform worse across virtually all observable dimensions. Most notably, these firms offer lower wages - even after accounting for worker fixed effects. Consequently, immigrants entering these firms may face significant limitations in wage potential, impeding their prospects for upward mobility and advancement within the labor market.

Table 1: Immigrant sorting by worker power and firm power

	(1)	(2)	(3)	(4)	(5)
Union minority firm	0.011	0.006	0.009	0.006	0.007
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
<i>p-value</i>	0.000	0.000	0.000	0.009	0.000
<i>Interaction term with high level of:</i>					
LLM-occupation HHI		0.024			
		(0.005)			
<i>p-value</i>		0.000			
Dodini et al., (2024) task HHI			0.010		
			(0.004)		
<i>p-value</i>			0.010		
Bassier et al., (2022) firm power				0.005	
				(0.004)	
<i>p-value</i>				0.133	
Product market share HHI					0.017
					(0.005)
<i>p-value</i>					0.000
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Concentration term X Year FE	No	Yes	Yes	Yes	Yes
Firms	9,026	9,026	9,026	5,498	9,026
Observations	18,052	18,052	18,052	10,996	18,052

Notes: This table reports estimates of immigrant sorting (EU 2004 immigrant share, measured in 2011) by both worker power and firm power, both as measured at baseline. Worker power is measured as a function of union density at each firm at baseline, and we classify firms with less worker power as those where a minority of their workers are members of a union. We use various measure of firm power. First, we use a standard measure of monopsony power based on the local labor market and occupation HHI index for each firm’s occupation mix. Second, we use a similar measure of monopsony power, but this time base it on task-clusters rather than directly on occupations Dodini et al. (2024a). Third, we use a measure of firm power based on separation rates, following Bassier et al. (2022). Fourth, we complement measures based on labor market power with a measure of product market power based on revenue shares within the sector and local labor market. We binarize all these measure of firm power before interacting them with our binary measure of worker power.

5 Effects on firms and incumbent workers

How are firms with varying levels of worker representation affected by immigrant-induced labor supply shifts? Building on the empirical results from the previous section, which examine immigrant sorting across firms based on worker power, we employ this framework to assess the causal

impact of immigrant sorting on firm competition, incumbent careers, aggregate productivity, and equality.

Firm-level Analysis. Our analysis is based on a difference-in-differences design in which we compare the outcomes of union-minority firms with the outcomes of union-majority firms before and after the eastward expansion of the EU. We focus on outcomes across four core margins of adjustment: labor usage (share of EU2004 workers, share of other immigrants, total number of workers, total number of worker hours, mean wages, and hourly wages), input substitutions and complementarities (materials, capital, machines, personnel cost, and revenues), production scale-up and productivity (labor share of costs and revenues, mean worker fixed effects, and revenue per worker hour), and outputs (profit, labor market share, product market share, board compensation, and firm survival).

We begin by estimating non-parametric event study models that allow us to trace the treatment effects over time and examine support for the common trend assumption required for causal inference in our setting. Specifically, we estimate the following model:

$$Y_{fst} = \sum_{t=2000}^{2011} \beta_t (\mathbf{1}[t_f = t] \times \text{Minority}_f) + \pi_{st} + \lambda_f + \epsilon_{fst}, \quad (1)$$

in which Y_{fst} represents an outcome for firm f in sector s at time t . In this equation, Minority_f is a binary variable measuring the level of worker power in the year prior to the EU expansion ($\text{uniondensity} < 50\text{percent}$), and represents our treatment variable. The coefficient of interest, β_t , measures the difference in outcome Y between union minority and union majority firms in the same sector each year. This equation identifies both pre-treatment relative trends ($t = 2000$ through $t = 2003$) as well as time varying treatment effects ($t = 2004$ through $t = 2011$). To avoid any endogenous union change in response to the 2004 enlargement, we fix union density in the year prior to the event (2003). We obtain our first-stage results by setting Y to equal the share of workers coming from the 2004 EU accession countries.

In our main specification, we include firm fixed effects (λ_f) and sector-by-year fixed effects (π_{st}). The firm fixed effects absorb any systematic differences across firms that are constant over time. Because of the firm fixed effects, all identifying variation comes from within firms over time. The sector-by-year fixed effects remove the risk of trends or secular shocks in sectoral sorting from driving our effects.¹⁷ We cluster the standard errors at the firm level, which is the level of treatment variation.

¹⁷Because municipality is a fixed characteristic of firms, we do not include municipality fixed effects. Since firms may operate in more than one municipality we prefer not to include municipality-by-year fixed effects in our main specification. However, in supplementary specifications shown in the online appendix, we include such interacted fixed effects, such that we further restrict the yearly identifying variation to be within municipality groups. This has no impact on the results that we find.

To parsimoniously summarize the large set of coefficients obtained through estimation of Equation 1, we present results from a simplified difference-in-differences framework. To make our comparison as transparent and informative as possible, we restrict our estimation sample to observations in 2003 and 2011. This means that the differences-in-differences estimates exactly correspond to the event-study estimate in 2011. This is our preferred specification, since the dynamic effects of firm competition take time to develop – and reporting an average over the full post-period provides an estimate of a parameter which is difficult to interpret. The event studies complement this approach by illustrating how these effects evolve over time, and offering a comprehensive picture of the time dynamics. We specify the estimating equation as follows:

$$Y_{fst} = \beta(\text{Minority}_f \times \text{Post}_t) + \pi_{st} + \lambda_f + \epsilon_{fst}, \quad (2)$$

in which β measures the mean difference in outcome Y between firms with a minority of union members and those with a majority of union members. With our balanced panel of firms, this approach collapses to a single two-by-two differences-in-differences approach, avoiding concerns regarding staggered difference-in-differences estimates brought up in the recent literature (Callaway et al., 2021; Athey and Imbens, 2022; Roth et al., 2023). We report the robustness of our core finding to a range of alternative specifications in Table A.3.

Individual-level Analysis. After having examined the role of the behavior of firms, we disaggregate the data to the individual level and examine how incumbent workers at these firms are affected. To do so, we estimate modified versions of the event study and the difference-in-differences design presented above:

$$Y_{ifsm_t} = \sum_{t=2000}^{2011} \beta_t(\mathbf{1}[t_f = t] \times \text{Minority}_f) + \pi_{st} + \gamma_{mt} + \lambda_f + \omega_i + \zeta_{age} + \epsilon_{ifsm_t}. \quad (3)$$

$$Y_{ifsm_t} = \beta(\text{Minority}_f \times \text{Post}_t) + \pi_{st} + \gamma_{mt} + \lambda_f + \omega_i + \zeta_{age} + \epsilon_{ifsm_t}. \quad (4)$$

The individual-level equations differ from the firm-level regressions in that they include additional terms for individual fixed effects and age fixed effects, ensuring that we account for any systematic differences across workers that are constant over time, as well as any time-invariant differences across individuals of different ages. Note that the firm fixed effects are based on the firm that incumbents worked for at baseline (2003), and can therefore be included in the model despite the inclusion of individual fixed effects. In our main individual-level analysis, we report standard errors clustered at the firm level (Bertrand et al., 2004). However, because these standard errors may be too conservative (Abadie et al., 2023), we also report standard errors clustered at the

worker level. Given the size of our analytical sample and the precision of the effects we identify, the decision of whether to cluster on the firm level or the worker level has no impact on our results.

Identifying Assumptions. The key assumption required for causal inference in our setting is that, absent treatment, the potential outcomes of treated and untreated units would evolve in a parallel fashion. While this assumption is fundamentally untestable, we can obtain suggestive evidence of the validity of this assumption by examining the pre-treatment trends obtained through Equations 1 and 3. Encouragingly, we find no evidence of diverging trends in the share of immigrants from EU enlargement countries prior to 2004 between union-minority and union-majority firms (Figure 5).¹⁸ In addition, we find no evidence of divergent trends in firm characteristics (Figures A.8- A.11). Further, post-period worker outcomes cannot be explained by trends prior to 2004 (Figure A.12). These results provide strong evidence in support of the main identifying assumption required for causal inference in our setting, and we discuss them in greater detail below.

In addition to the parallel trend assumption, we require that there are no secular trends or shocks that occur concurrently with the EU enlargement of 2004 that differentially impact union-majority and union-minority firms and that are correlated with our outcomes. We note that the enlargement of the EU did not coincide with any other Norwegian labor market reform or policy that could differentially influence the two sets of firms. We also probe for the robustness of our main specification by allowing for the inclusion of sector-by-year fixed effects, and by allowing for the inclusion of municipality-by-year fixed effects in our robustness specification, which removes the risk of trends or secular shocks in sectoral sorting and municipality sorting from driving our effects.

A characteristic of our setting is that the markets in which firms operate are inherently competitive: when one firm gains an advantage in the labor or product market, it can have adverse effects on other firms. In our context, as in nearly all causal analyses in competitive settings (Bleemer, 2022, e.g.), this impact how we interpret our results. Specifically, our estimates should not be interpreted as reflecting the effects of a shift in labor supply in the abstract, or one that impacts all firms equally. Instead, our approach estimates the relative effect of immigration for firms with varying baseline levels of worker representation. This is arguably the key policy parameter when examining how worker sorting across firms shapes the competitive landscape, affects workers, and ultimately influences aggregate productivity and equality.

¹⁸Because of the low prevalence of workers from these countries prior to the 2004 enlargement, a standard immigrant shift-share analysis does not perform well in our setting. See Figure A.7.

6 Firm-Level Analysis

The large labor supply shift generated by the EU enlargement in 2004 represents a positive shock to one of the key inputs in a firm's production process —labor. In addition, and perhaps more importantly, these workers represent a relatively cheap source of labor compared to native Norwegians. Specifically, Table A.8 shows that, conditional on firm and occupation, immigrants from these countries are five percentile ranks lower down in the 2011 national wage distribution compared to other workers with the same education level, age, and gender. To the extent that immigrants are pushed into lower-paid occupations than incumbent workers with similar educational levels and experience, this wage gap will be even larger. This possibility is supported by Table A.5, which indicates that, despite higher levels of education, new immigrants tend to enter lower-paying occupations, are less likely to assume managerial roles, and earn lower hourly wages compared to other new workers.¹⁹ As such, firms who can capitalize on the migration inflow may be able to use this new source of labor to adjust their use of labor, change their input mix, improve productivity, scale up production, and potentially alter their profits. Additionally, the ability to better absorb the new wave of immigrants may give firms with low levels of worker power a competitive advantage over more union-dense firms, enabling them to outcompete these firms and capture market share.

To examine how firms with varying baseline levels of worker representation respond to shifts in labor supply, we employ event-study and differences-in-differences strategies, as outlined in Section 4. We pay close attention to the effects on firms across four key margins of adjustment: labor usage (share of EU2004 workers, share of other immigrants, total number of workers, total number of worker hours, mean wages, and hourly wages), input substitutions and complementarities (materials, capital, machines, personnel cost, and revenues), production scale-up and productivity (labor share of costs and revenues, mean worker fixed effects, revenue per worker hour), and outputs (profit, labor market share, product market share, board compensation, and firm survival).

Before presenting the core results from the firm-level analysis, we note that the labor supply shift may alter the composition of surviving firms in the market. This can affect the magnitude, significance, and interpretation of our findings. For all our results we, therefore, present point estimates from two separate specifications: one using the full sample and setting the outcome to zero in the event of firm exit (Panel A of each result table) and one that restrict the sample to surviving firms in the market (Panel B of each result table). While we primarily focus on the full sample analysis in this section, we discuss results from the restricted sample whenever they deviate from those based on the full sample. It is also important to note that we focus on 2003 and 2011 in the differences-in-differences framework to capture an aggregate effect on the total dynamics

¹⁹Immigrants may be willing to accept such roles as long as the pay in these firms is higher than in their home country.

of worker power and immigrant sorting. This means that the differences-in-differences estimates exactly correspond to the event-study estimate in 2011. We prefer this approach as it provides a clearer understanding of the full impact and facilitates interpretation. This also means that the coefficient we report is the largest in the event-study period. The evolution of these effects over time is separately detailed in the event-study estimates.

6.1 Labor Usage

We present our core findings on labor usage in Table 2, which shows the difference-in-differences estimates for the share of EU 2004 workers, share of other immigrants, total number of workers, total number of worker hours, mean wages, and hourly wages. The corresponding event studies are shown in Figure A.8 and provide strong evidence in favor of the common trends assumption, with no indication of pre-treatment trends that differentially affect treatment and control firms.²⁰

Column (1) of Table 2 replicates the first-stage result discussed in the previous section, illustrating that union-minority firms are significantly more likely to absorb workers from the new EU countries, even when compared to firms within the same sector. Column (2) shows that there is no concurrent increase in the extent to which union-minority firms employ other immigrant workers, suggesting that the result in Column (1) is driven by the EU 2004 labor supply shock rather than by a general increase in the demand for immigrant workers. Moreover, this finding indicates that access to EU 2004 workers does not substitute for other immigrant workers. Instead, as shown in Column (3), the hiring of EU 2004 workers represents an overall expansion in the size of the firms. At the end of our sample period, union-minority firms are on average 9 percent larger than union-majority firms relative to their size in the base year. That said, given the differential rates of firm survival (discussed below), the effect on firm size is to a great extent driven by a decrease in exit among union-minority firms. When we restrict the sample to surviving firms, we find that firm size in union-minority firms grew by 3.7 percent, with approximately one-third of this growth attributed to new EU 2004 workers. The remaining two-thirds of the growth comes from the hiring of additional native workers.

This finding suggests significant complementary skill dynamics between native and immigrant labor in the firm production process. Access to the relatively cheaper EU 2004 labor removes a key constraint, allowing firms to scale up labor more broadly. The complementarity between immigrant and native labor aligns with recent literature on this topic, which finds that large labor migration shifts generate a subsequent labor demand shift higher up in the occupation ranking, leading to incumbent workers climbing the career ladder more quickly (e.g., Beerli et al., 2021). To explore

²⁰In addition to reporting results from our main specification in which we split firms into two groups based on whether a minority or majority of their workers are union members at baseline, we also report estimates using the continuous measure of baseline union share in the Appendix (Table A.9, Panel A).

this in more detail, Appendix Table A.5 compares new EU 2004 hires at union-minority firms with new native hires at the same firms (conditional on sector). The table shows that EU 2004 hires are generally older, more likely to be men, and more likely to hold a college degree (i.e., they appear positively selected), but they are less likely to be managers, more likely to work in lower-paying occupations, earn less, and work more hours. This pattern holds when comparing new EU 2004 hires at union-minority firms with new hires at union-majority firms (Appendix Table A.6). These findings are consistent with the Roy model, where native workers with higher skills self-select out of firms with weaker union representation (Roy, 1951), leaving lower-skilled natives behind.

Column (4) of Table 2 shows that firms are not only hiring additional workers, but that they also are extending the number of hours that the employees work. As discussed above, this is entirely driven by the EU 2004 workers being hired into contracts that require additional hours.

Lastly, Columns (5) and (6) examine the average cost of wages per worker and average hourly wages for workers. Across both columns, we see a relatively large positive effect in response to the rapid inflow of EU 2004 workers. While this result is notable, when we limit our analysis to firms that survive through 2011 (Panel B of Table 2), the estimates are considerably smaller and no longer statistically significant. Nonetheless, theory would predict that a labor supply expansion generates downward wage pressure, leading to a reduction in average wages rather than to an increase (or no change) in average wages.

In Appendix Table A.5, we show that the positive wage effect is not driven by the EU 2004 workers; they are hired into positions with wages that are far below those of their native colleagues at the workplace. Rather, as we will show later, these effects are driven by three factors that are strongly consistent with the broader context of our analysis: (1) new native hires who complement lower cost immigrant labor, (2) incumbent workers who experience accelerated career ladder effects and see increased managerial responsibilities as well as wages in response to the inflow of EU 2004 immigrants, and (3) compensation to board members who extract a big share of the increased rents from the firm scale-up. (1) and (2) are indicative of the initial labor supply shift generating a subsequent labor demand shift for specific workers, and bear strong resemblance with the findings in Beerli et al. (2021). To the best of our knowledge, (3) is new to the literature.

When analyzing the overall labor responses to the immigrant supply shock in Norway, a consistent pattern emerges: firms with weak worker power capitalize on the newly available high-quality, low-cost labor by absorbing it into their workforce. The hiring of EU 2004 workers is accompanied by additional native hires, demonstrating the complementarity between native and immigrant workers and highlighting the broad-based labor scale-up generated by the immigrant labor supply shock.

Table 2: Firm inputs: Union minority vs. union majority firms

	EU 2004 share	Share other immigrants	Employees	Firm man hours	Mean wages	Hourly wages
<i>Panel A: All firms</i>						
Union minority firm, 2011	0.011 (0.002)	-0.002 (0.003)	0.094 (0.021)	0.147 (0.049)	0.113 (0.019)	0.089 (0.025)
p-value	0.000	0.450	0.000	0.003	0.000	0.000
Firms	9,026	9,026	9,026	8,980	9,026	9,026
Observations	18,052	18,052	18,052	17,960	18,052	18,052
<i>Panel B: Limit to operational firms</i>						
Union minority firm, 2011	0.012 (0.002)	-0.005 (0.003)	0.037 (0.023)	0.094 (0.063)	0.056 (0.017)	0.023 (0.028)
p-value	0.000	0.090	0.114	0.136	0.001	0.412
Firms	6,608	6,608	6,608	6,589	6,608	6,608
Observations	13,216	13,216	13,216	13,178	13,216	13,216
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on union minority versus union majority firms following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. Panel A shows results for the full population of firms in the estimation sample, with outcomes coded to zero when a firm is no longer operational. Panel B restricts the estimation sample to firms still operating in 2011.

6.2 Input Substitution and Complementarity

We present our core findings on input substitution and complementarities in Table 3, which shows the difference-in-differences estimates on materials, capital, machines, personnel, and revenues. The corresponding event studies are shown in Figure A.9 and provide strong evidence in favor of the common trends assumption, with no indication of pre-treatment trends that differentially affect treatment and control firms.²¹

²¹Estimates using a continuous measure of worker power are reported in Table A.9.

Table 3: Firm input substitutions and complementarities: Union minority vs. union majority firms

	Personnel	Materials	Capital	Machines	Revenue
<i>Panel A: All firms</i>					
Union minority firm, 2011	0.127 (0.023)	0.068 (0.036)	0.180 (0.035)	0.011 (0.046)	0.144 (0.031)
p-value	0.000	0.058	0.000	0.813	0.000
Firms	9,026	9,026	9,026	9,026	9,026
Observations	18,052	18,052	18,052	18,052	18,052
<i>Panel B: Limit to operational firms</i>					
Union minority firm, 2011	0.055 (0.023)	-0.048 (0.044)	0.114 (0.039)	-0.050 (0.062)	0.062 (0.033)
p-value	0.019	0.274	0.003	0.421	0.061
Firms	6,608	6,608	6,608	6,608	6,608
Observations	13,216	13,216	13,216	13,216	13,216
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on union minority versus union majority firms following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. Panel A shows results for the full population of firms in the estimation sample, with outcomes coded to zero when a firm is no longer operational. Panel B restricts the estimation sample to firms still operating in 2011.

Column (1) of Table 3 shows that total personnel costs are increasing in union-minority firms, an effect driven both by the hiring of additional workers and by an increase in the average wages of incumbent workers. Columns (2) and (3) show that this labor expansion is complemented with a somewhat smaller increase in spending on raw materials and a proportionate increase in capital spending. There is no effect on machine spending (Column 4). These results suggest that the labor effect generated by the EU expansion led to a broad-based production scale-up across the firms' inputs. However, the shift in labor was greater than that in other inputs, implying a certain degree of substitution, which we discuss below.

Column (5) of Table 3 shows that the input expansion experienced by union-minority firms led to a significant increase in their sales revenue. By the end of the analysis period, sales revenue had increased by approximately the same percentage as spending on labor and capital.

Taken together, the results from this subsection highlight that union-minority firms are able to leverage the availability of EU 2004 workers to expand and scale up their production, resulting in a substantial increase in overall revenues.

6.3 Production Scale-up and Productivity

To better understand the role of labor in the firm's scale-up process, Table 4 shows the difference-in-differences estimates on the labor share of costs, the labor share of revenues, mean worker fixed effects, and revenue per worker hour. The corresponding event studies are shown in Figure A.9 and provide strong support for the common trends assumption.

Columns (1) and (2) of Table 4 show that labor is increasingly important for firm operations, both in terms of overall costs and revenues, although the labor share of revenue coefficient is noisy. That is, while union-minority firms expand across most key production inputs, labor grows more than other inputs. This suggests that these firms are becoming more reliant on labor, indicating that the immigrant labor supply shock may have alleviated previous labor constraints, allowing firms to better allocate inputs.

Column (3) shows that there is no effect on the mean worker fixed effect at union-minority firms, a variable calculated via the bias-adjusted AKM-approach detailed in Bonhomme et al. (2023). This implies that union-minority firms are not experiencing real productivity effects in response to the EU expansion, but also that they are not experiencing any productivity reductions (which could be the case if, for example, the new hires were of lower quality relative to the incumbents).

Finally, Columns (4) and (5) show that workers are putting in more hours at the firm, and that the revenue per worker hour is marginally increasing. This effect is driven entirely by firm exit: once we condition on firm survival there is no impact on revenue per worker hour.

Table 4: Firm labor scale-up: Union minority vs. union majority firms

	Labor share of costs	Labor share of revenues	Mean worker FE	Hours per worker	Revenue per worker hour
<i>Panel A: All firms</i>					
Union minority firm, 2011	0.069 (0.014)	0.206 (0.446)	0.011 (0.014)	0.086 (0.016)	0.061 (0.033)
p-value	0.000	0.644	0.457	0.000	0.066
Firms	9,026	7,643	4,944	8,980	9,026
Observations	18,052	15,286	9,888	17,960	18,052
<i>Panel B: Limit to operational firms</i>					
Union minority firm, 2011	0.035 (0.011)	0.175 (0.597)	0.010 (0.015)	0.032 (0.015)	-0.052 (0.038)
p-value	0.002	0.769	0.491	0.035	0.174
Firms	6,608	5,620	4,679	6,589	6,608
Observations	13,216	11,240	9,358	13,178	13,216
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on union minority versus union majority firms following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. Panel A shows results for the full population of firms in the estimation sample, with outcomes coded to zero when a firm is no longer operational. Panel B restricts the estimation sample to firms still operating in 2011.

6.4 Outputs

So far, our analysis has focused on examining the impact of the labor supply shift on labor usage, input substitution and complementarity, and production scale up. A key question that remains is to what extent the combination of these effects influence the output and end-line results of union-minority firms.

To this end, Table 5 shows the difference-in-differences estimates on profit, labor market share, product market share, board compensation, and firm survival. The corresponding event studies are shown in Figure A.10 and demonstrate that there is no evidence of pre-treatment trends that differentially operate in treatment and control areas and that also are correlated with the outcomes in a way that could risk bias our results.

Column (1) of Table 5 shows a positive but noisy effect on firm profits. The lack of a statistically significant effect is an expected implication of the revenue expansion documented in the previous section, which puts downward pressure on output prices and involves an increase in price

competition among firms. This likely prevents firms from converting the additional sales revenue into pure profits in the short-run.²²

Columns (2) and (3) show that the scale-up of union-minority firms, both in terms of inputs and outputs, enable them to capture large shares of the markets; both on the product side as well as on the labor side. This is a consequential result, implying that union-minority firms may be able to acquire additional price-setting power in the long run, with important effects on labor market wage markdowns, product market price markups, and profits. On an aggregate level, however, this implies that certain aspects of the labor and product markets are becoming more competitive. Specifically, since union-minority firms are on average smaller, hire fewer workers, and produce less, their expansions generate a reduction in market concentration and power among the large firms. We return to this point when we use a simple structural model to calculate the overall impact on the aggregate economy in Section 8.

Column (4) indicates that leadership at union-minority firms is able to capture some of the benefits from the production scale-up, with a 4 percent increase in compensation compared to the baseline. This is a large effect, and may help explain the lack of a profit effect in Column (1) as well (which is calculated net of board compensation).

Finally, column (5) examines firm survival, which is an important outcome given that the competitive advantage created by the migration-induced labor supply shock may have helped union-minority firms outperform union-majority firms, making them more likely to remain in business. Table 3 shows these results directly, demonstrating that firms with little worker power are able to utilize the labor supply shift to remain in the market. This is consistent with our prior results on union-minority firms being able to capture larger parts of the markets. The effects on firm exit are large and align with the results from Mahajan (2024), who shows that firm exit explains nearly half of the effects on firm outcomes.

Taken together, the results from our firm-level analysis paint a clear picture: worker power hinders firms from fully capitalizing on labor supply shifts driven by new waves of migrants. As a result, most migrants are pushed into lower-quality firms characterized by greater employment uncertainty, lower wages, and fewer fringe benefits. Over time, union-minority firms are able to scale up production in response to the labor supply shock. This scaling leads to an increase in sales revenues, a weak suggestive rise in profits, and noticeable shifts in both labor and product markets in which these firms operate. Interestingly, because union-minority firms are smaller and less productive to begin with, their growth in size and increased market share suggest that the sorting of migrants into these firms may foster more competitive but less efficient markets.

²²However, we also see increases in labor shares and product shares, suggesting an increase in price-setting power in the long run. Thus, profit effects may take a bit longer to show up in the data.

Table 5: Firm output: Union minority vs. union majority firms

	Profit	Labor market share	Product market share	Board compensation	Firm survival
<i>Panel A: All firms</i>					
Union minority firm, 2011	1.035 (1.241)	0.010 (0.002)	0.013 (0.004)	0.041 (0.013)	0.058 (0.010)
p-value	0.405	0.000	0.003	0.001	0.000
Firms	9,026	9,026	9,026	9,026	9,026
Observations	18,052	18,052	18,052	18,052	18,052
<i>Panel B: Limit to operational firms</i>					
Union minority firm, 2011	1.504 (1.738)	0.003 (0.002)	-0.005 (0.004)	0.024 (0.017)	
p-value	0.387	0.072	0.188	0.146	
Firms	6,608	6,608	6,608	6,608	
Observations	13,216	13,216	13,216	13,216	
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on union minority versus union majority firms following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. Panel A shows results for the full population of firms in the estimation sample, with outcomes coded to zero when a firm is no longer operational. Panel B restricts the estimation sample to firms still operating in 2011.

7 Incumbent workers

In this section, we disaggregate the data to the individual worker level and examine the impact on incumbent workers. To perform our analysis, we use the event-study approach and differences-in-differences design described in Section 4. The individual-level regressions in this subsection differ slightly from the firm-level regressions in that we now include individual and age fixed effects. In addition, since each individual had exactly one primary municipality of work in 2003, we can also include municipality-by-year indicators in our main specification.

Our core findings from the worker-level analysis are presented in Table 6, which shows the difference-in-differences estimates on income rank, employment, management responsibilities, and occupational rank. The corresponding event studies are shown in Figure A.12. Similar to our firm-level results, the individual-level event studies show no evidence of pre-treatment trends that differentially operate in treatment and control firms. The event studies also illustrate that there is a clear break in the time series in 2004, concurrent with the expansion of the EU. The only

outcome with a slight pre-treatment trend is management propensity among incumbent workers in union-minority firms. However, this trend is small and in the opposite direction of the post-reform effect that we identify. In addition, there is a clear break in this trend after 2004, providing strong evidence in favor of a causal effect on management probability in union-minority firms following the EU expansion.

Column (1) of Table 6 shows that workers at union-minority firms experience small but statistically significant wage growth after the migration shock. Relative to incumbent workers at union-majority firms, they move up by half a percentile rank in the national wage distribution. This wage effect is consistent with the idea that immigrant workers, who typically earn lower wages, complement incumbent workers at these firms. Additionally, the wage growth coincides with incumbents moving into management positions (column 3). However, we do not observe a shift to higher-paying occupations, suggesting that the wage gains stem from incumbents taking on more managerial roles within their current occupations (column 4).

While incumbent workers improve their incomes and shift into management, they also experience a slight increase in the probability of unemployment (column 4), perhaps due to increased competition with immigrants within their firms. However, this effect is not economically significant.²³ Further, while we saw that workers in union minority firms experienced significantly higher annual separation rates prior to 2004 (Table A.1, we find that in 2011, there is no detectable effect on changing firms (Column 5). This suggests that the inflows of immigrant labor may have helped to stabilize employment in union minority firms.²⁴

In terms of effect heterogeneity, we find that young incumbent workers, and incumbent workers with slightly lower wages, drive our individual-level results (Tables A.15 and A.16). This is indicative of the labor supply shift of EU 2004 workers helping younger incumbents to fast-track through the career ladder and secure management roles sooner than they would have in the absence of the labor supply shift. For very senior incumbent workers with already high salaries, we do not see any statistically significant or economically meaningful effects.

This paper is motivated by the idea that worker power may influence patterns of immigrant sorting, a process with significant implications for immigrant opportunities, firm growth, and the career trajectories of incumbent workers. In the final set of analyses, we reverse the question: how does exposure to immigrants influence union membership rates among incumbent workers? On one hand, incumbent workers at union minority firms are enjoying small but positive wage gains.

²³Note that we see no statistically significant differences in effects across incumbent natives and incumbent immigrants (Table A.14). Given that we include individual fixed effects, this is perhaps unsurprising, as we control for any systematic difference between incumbent natives and immigrants in, for example, substitutability/complementarity with the new entrants.

²⁴There are several factors that potentially can drive this reduction in separation rates in union-minority firms, some of which may involve the higher income and additional managerial responsibilities that incumbents experience, making them less likely to leave.

On the other hand, they may experience an increase in the perceived threat posed by competition from immigrants.

To examine this question, we estimate our individual-level regressions using union membership as the outcome variable of interest. Since union membership is a social phenomenon and may have spillovers within sectors and communities, we show results with and without sector-by-year and municipality-by-year fixed effects. The results are provided in Table A.13 and Figure A.13. The results illustrate that incumbent workers at union-minority firms become increasingly likely to join their local union in response to the firms increased exposure to, and utilization of, the new migrants. As in Tabellini (2020), the gifts of immigrants, therefore, generate incumbent backlash. We speculate that this effect stems from incumbents feeling threatened by increased competition from immigrant workers. Dynamically, this finding is important. On one hand, it may improve working conditions in less unionized firms (Dodini et al., 2023b). On the other hand, as union density increases within firms, they may become less capable of adapting to future technological shocks.

Table 6: Minority versus majority union firms

	Income rank	Employment	Manager	Occupation income rank	Change firms
Union minority firm, 2011	0.005 (0.002) [0.001]	-0.000 (0.000) [0.000]	0.023 (0.003) [0.002]	0.001 (0.002) [0.001]	0.020 (0.021) [0.004]
p-value firm clusters	0.021	0.166	0.000	0.794	0.354
p-value person clusters	0.000	0.192	0.000	0.528	0.000
Individual FE	Yes	Yes	Yes	Yes	Yes
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	137,052	137,052	137,052	132,916	137,052
Observations	274,104	274,104	274,104	265,833	274,104

Notes: This table reports differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. Standard errors from specifications with errors clustered at the firm level are shown in parentheses, while those from specifications with errors clustered at the individual level are shown in brackets. P-values from with both types of clustering are reported.

8 Aggregate effects of immigrant sorting to less unionized firms

Finally, we study the potential effects of immigrant sorting on aggregate production under alternative patterns of allocation across firms. As has been documented in prior research in our setting, more unionized firms are more productive than less unionized firms (Løken et al., 2013; Dodini et al., 2023b). Our goal is to understand what would have happened if, rather than sorting to firms with weak unions, immigrants were allocated across firms at random – or if immigrants systematically sorted to firms with stronger worker representation.

The key takeaway from this analysis is that, by shifting immigrants to lower productivity firms, worker representation reduces aggregate productivity and increases inequality between immigrants and natives (Figure 7). These results clarify that beyond simply crowning some firms as winners and others as losers, worker power gets in the way of the full potential of immigration to increase aggregate welfare.

We perform this analysis by estimating production functions for firms at baseline, and use a simple model to guide us towards what would have happened under alternative patterns in the allocation of immigrants across firms following EU enlargement. We start with the assumption that firms produce output following a Cobb-Douglas production functions for observable inputs.

$$Y = L^\beta K^\alpha M^\gamma I^\phi \quad (5)$$

In the above equation, L denotes firm size; K denotes assets; M denotes machinery; and I denotes materials. We observe each of these inputs at each firm annually. After taking logs, we estimate the production technology of each type of firm at baseline:

$$\ln Y_u = \beta \ln L_u + \alpha \ln K_u + \gamma \ln M_u + \phi \ln I_u + \epsilon \quad (6)$$

We report our estimates of the mean production technology in both types of firms in Appendix Table A.17.

Next we use these baseline production functions to estimate aggregate productivity – the sum of productivity in both types of firms – under two alternative scenarios. First, we study aggregate productivity if the allocation of immigrants had been random across firm types. Second, we study the aggregate productivity if immigrants had sorted to more unionized – rather than less unionized – firms. We report each of these estimates in relation to the actual productivity given the sorting we observe in 2011.

The first row of Table 7 presents the results from this exercise. Holding all else constant, re-allocating immigrant workers randomly across firms would have increased aggregate productivity by 2.3 percent across all incumbent firms. Under the alternative scenario, where immigrants are al-

located to more unionized firms, aggregate productivity would have increased by nearly 5 percent.

While these estimates suggest that the current allocation of immigrants to less unionized firms is suboptimal in terms of overall productivity, these back-of-the-envelope calculations should be interpreted with some caution. By assuming a fixed production function at baseline, we treat changes in firm composition as being of the same skill level. Additionally, our model does not account for the competitive effects of immigration on firm survival. The direction of the bias in our estimates, however, is ambiguous. If immigrants are over-qualified for their positions at firms with less worker representation, they might be even more productive in a more demanding occupation, which would bias our estimates downwards. At the same time, however, immigrants might be more productive than other workers at lower quality firms, in which case our estimates could be biased upwards.

Following the productivity results, we use our reduced-form estimates to assess how alternative patterns of immigrant allocation might affect labor market concentration across firms and product market concentration. These results indicate that while such patterns may shift production to more productive firms, they would likely increase concentration in both labor and product markets.

Lastly, we apply our reduced-form estimates to explore how alternative sorting patterns would affect inequality between workers. These findings show that allocating immigrants to less unionized firms increases the immigrant-native wage gap, but reduces the wage gap between workers in more versus less unionized firms.

Table 7: Productivity, competition, and inequality under alternative scenarios

	Sort as observed	Random sorting	Sort to majority union firms
<i>Firms: Productivity and competition</i>			
Aggregate productivity	1	1.023	1.047
<i>Mean labor market share</i>			
Minority union firms	0.031	0.026	0.020
Majority union firms	0.052	0.057	0.062
<i>Mean product market share</i>			
Minority union firms	0.082	0.075	0.069
Majority union firms	0.138	0.144	0.151
<i>Workers: Inequality in income rank</i>			
Minority vs. majority union firms	-0.033	-0.038	-0.044
EU 2004 immigrants vs. others	-0.041	-0.038	-0.035

Notes: This table reports estimates of productivity, competition, and inequality under alternative patterns of immigrant sorting to firms. Aggregate productivity is estimated as the total revenues for incumbent firms in 2011 given shifts in firm inputs corresponding to immigration-induced scale-up, but holding the production technology fixed at baseline levels. Mean labor and product market shares are observed in the left-most column, while the reduced form estimates from earlier in the paper are used to inform the simulations under alternative patterns of worker sorting. Likewise, wage gaps (in percentile ranks) between groups of workers are observed in the left-most column, while the reduced form point estimates on worker productivity are used for the simulations.

9 Discussion

We examine how two key features of modern labor markets—worker power and immigration—interact to shape immigrant opportunities, firm performance, incumbent workers, and society. Our main finding is that while union representation seeks to protect workers, it inadvertently restricts firms’ ability to fully leverage labor supply shifts driven by immigration. This not only limits economic opportunities for immigrants but also negatively affects firms and incumbent workers, ultimately reducing aggregate productivity and exacerbating existing inequalities.

Despite the importance of immigrant sorting within labor markets, empirical evidence on its causes and consequences remains extremely limited. Theoretical work in the social sciences suggests that worker power may restrict immigrants’ access to certain firms (Bonacich, 1972; Kahn, 1975; Lindbeck and Snower, 1989; Dickens and Lang, 1993). However, this has not been examined empirically. Furthermore, existing models fail to explore the downstream effects of immigrant sorting on firm performance, incumbent workers’ careers, and the broader implications for produc-

tivity and equity.

We focus on how the largest wave of immigration in the history of Norway shaped the landscape of competition between firms more and less constrained by worker power. We then use administrative registries linking together detailed measures of migration, union membership, firm inputs and outcomes, and worker-level data spanning more than a decade to understand the role of worker power in shaping the consequences of immigration.

Our analysis provides four key takeaways. First, we demonstrate that worker power significantly influences the sorting of immigrants across firms. Crucially, the firms that immigrants are directed to tend to be smaller, offer lower wages, have higher turnover rates, weaker job security, and provide fewer benefits. Essentially, worker power steers immigrants toward lower-quality firms, limiting their economic opportunities from the outset. This pattern provides some of the strongest empirical support for the canonical insider-outside model (Lindbeck and Snower, 1989, 2001).

Second, we demonstrate that the inability of firms to capitalize on shifts in labor supply due to the constraints imposed by worker power impedes their growth. In contrast, firms with weaker worker protections are able to leverage the migration shock to expand their workforce, invest more in capital, scale-up production, and capture larger market shares.

Third, incumbent workers in firms with lower levels of worker representation at baseline also benefit from the labor supply shock, experiencing wage increases as well as more rapid promotions into management positions. Still, despite benefiting from the labor supply shift, incumbent workers in union-minority firms are more likely to themselves join the union in the future. This may help improve worker protections in these firms, but can also come at the detriment of firms' ability to adapt to future shocks to production inputs.

Fourth, we show that the competitive advantage conferred upon firms with weaker worker power not only creates winners and losers from migration but also leads to reductions in aggregate productivity and increased inequality. Firms with weaker worker power are generally less productive, meaning that if more productive firms had benefited from the immigration influx, overall productivity would have risen. Additionally, by channeling immigrants into lower-paying firms, worker power exacerbates existing inequalities, particularly along immigrant-native divides (Bonacich, 1972; Lindbeck and Snower, 1989). This highlights the broader implications of labor market sorting on both economic performance and social equity.

This analysis advances several literatures. First, while a large literature spanning several decades has focused on how immigrants shape native employment and wages (e.g. Card, 1990; Borjas, 2003; Friedberg and Hunt, 2018), our results highlight the role of power-structures inside firms as a decisive channel in determining the winners and losers following shifts in labor market dynamics resulting from migration. In underscoring the role of power inside firms, our results

provide the first firm-level evidence on the role of labor market institutions as factors shaping the effects of immigration (Foged et al., 2022; Bisin et al., 2011; Angrist and Kugler, 2003). We find that immigrant sorting to non-union firms is greatest in less competitive markets, in line with new research assessing the market-level determinants of immigrant wages (e.g. Amior and Manning, 2020; Naidu et al., 2016). In addition, while recent papers have begun to look at the effects of immigration on firms (e.g. Mahajan et al., 2024; Doran et al., 2022), our results help understand why some firms hire immigrants while others do not, and what the distributional effects of this are. We also build on the research focused on understanding the causes of immigrant-native wage gaps (e.g. Rooth, 2010; Oreopoulos, 2011; Alsan and Yang, 2022), highlighting a further driver of immigrant-native gaps in employment and wages – power structures within and across firms. Finally, beyond the literature on immigration, our results extend our understanding of why some firms are successful in adapting to changes in production technologies while others are not (e.g. Fontagné et al., 2023; Acemoglu and Restrepo, 2020; Harasztsosi and Lindner, 2019).

In terms of policy implications, our results show that migration shocks reduce the labor supply restrictions of firms and facilitate production scale-up. However, firms are differentially able to respond to these shocks as a function of the power that their incumbent workers possess, something that dramatically alters the competitive landscape among firms within the market. Not only does this provide important insights to the policy debates on immigrant integration and the mechanisms underlying the native-immigrant labor market gaps, but it also contributes important knowledge to our understanding of the interaction between labor market institutions and migration. Finally, these results can help policy-makers and academics predict and prepare for the dynamics of how future migration shocks can affect firms and their workers. While this paper focuses on worker power and immigration, it is important to note that these dynamics likely extend to firms' ability to adapt to shifts in other factors of production as well. Understanding these additional drivers is crucial for designing efficient labor market policies and integration initiatives.

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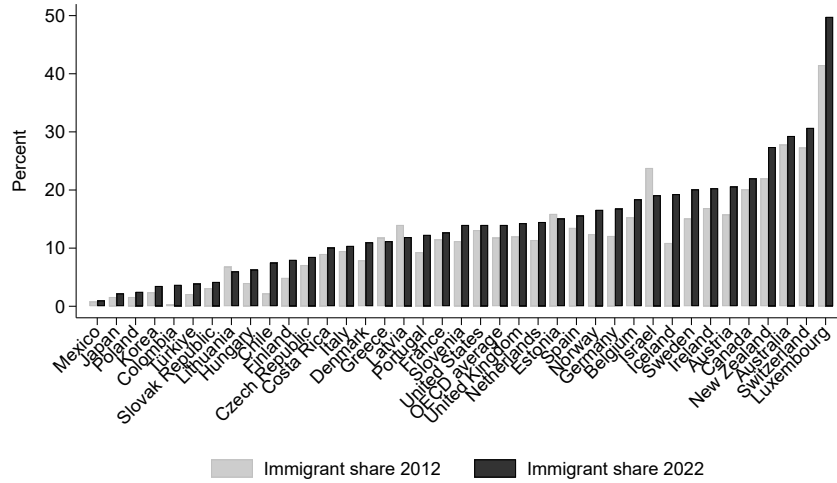
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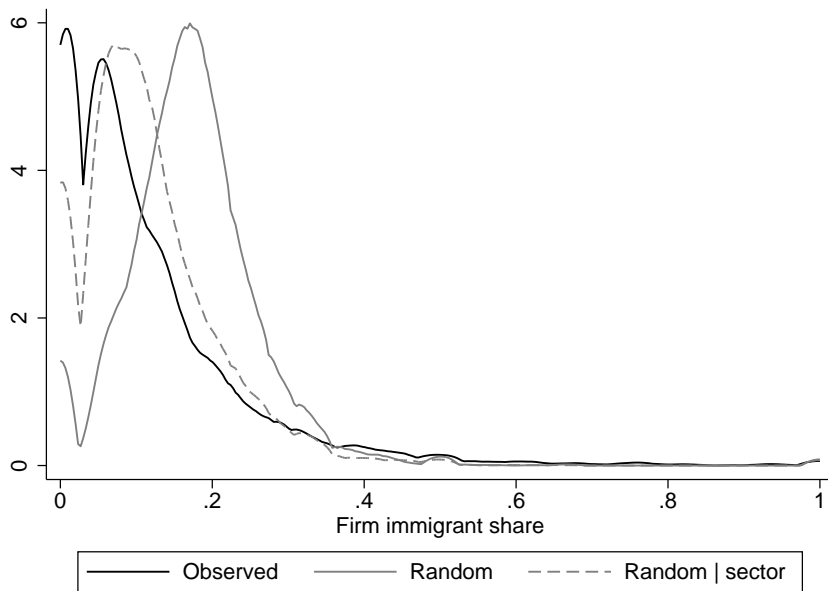
A Appendix Figures and Tables

Figure A.1: Immigrants in the workforce

(a) Immigrant share of workforce across OECD countries



(b) Immigrant sorting into firms – Norway, 2003

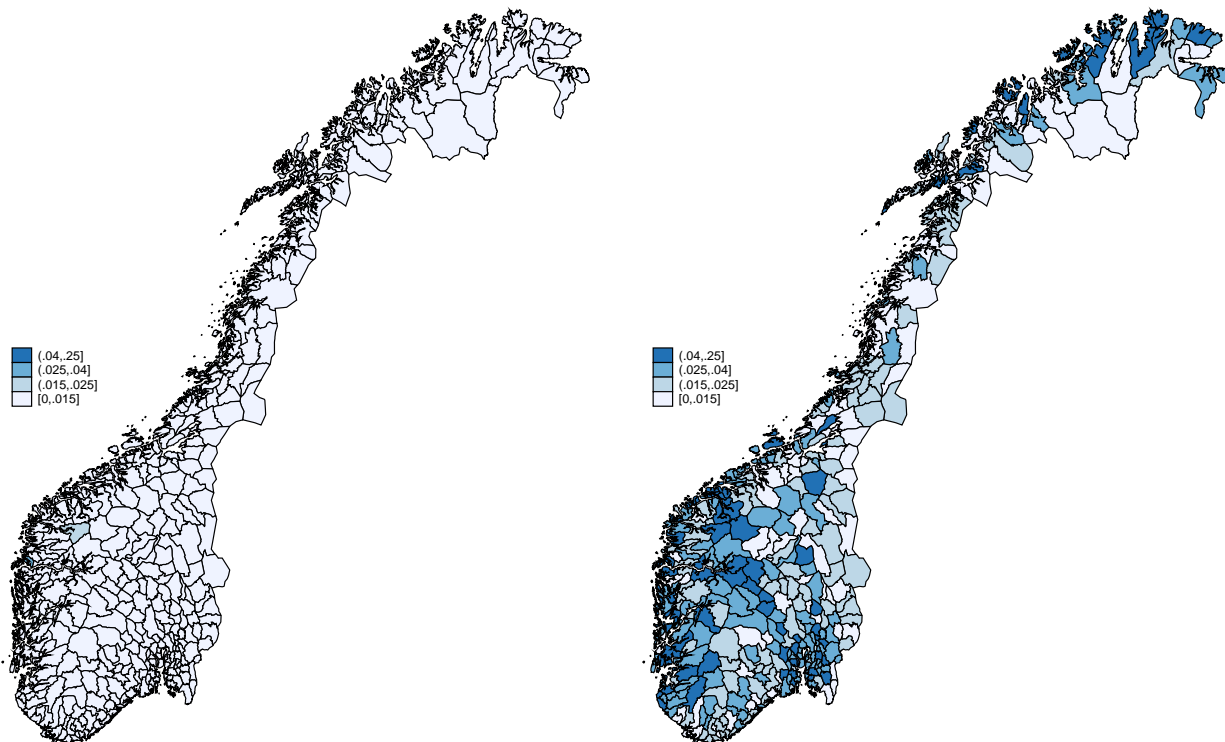


Notes: Figure (a) shows that the share of immigrants in the workforce has increased across nearly all OECD countries between the years 2012 and 2022. Data from OECD (2023). Figure (b) shows the distribution of firms by their immigrant shares in 2003 (black line). This distribution is complemented by the distribution of firms by their immigrant shares – if immigrants were randomly allocated across firms (gray line). The third distribution represents the distribution of firms by immigrant shares – if immigrants were in their existing sectors, but randomly allocated across firms (dashed line).

Figure A.2: Immigrants from 2004 European Union enlargement countries

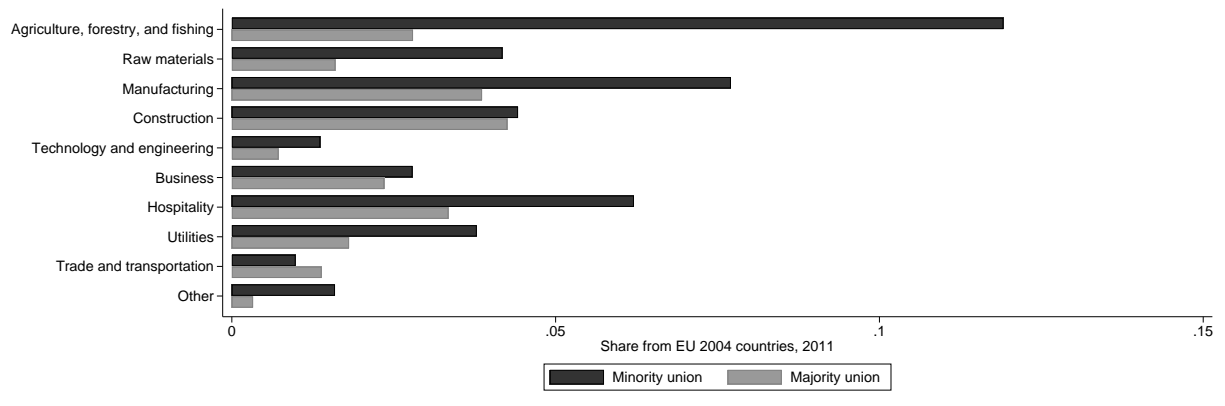
(a) Share of working age population, 2003

(b) Share of working age population, 2011



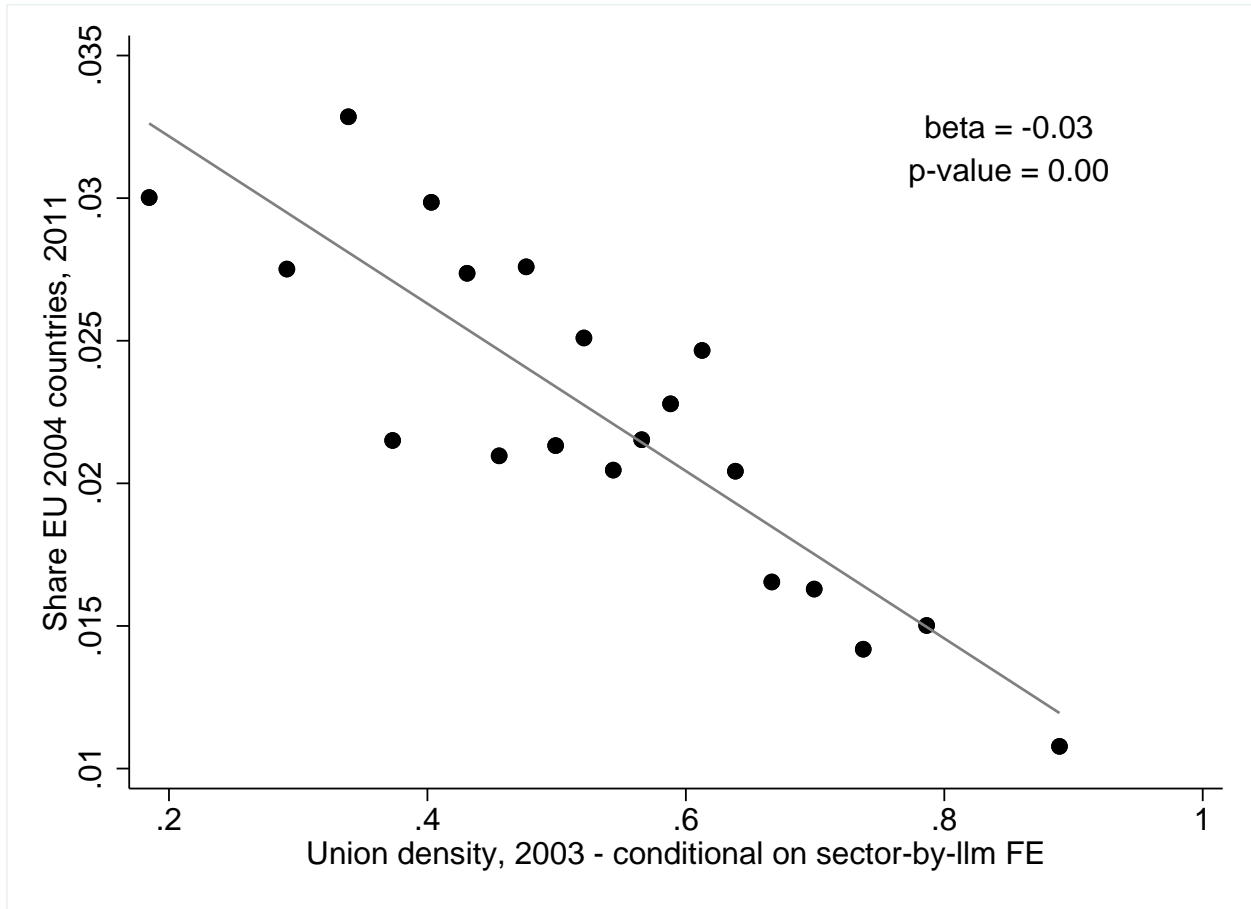
Notes: Figure (a) shows the 2003 share of the working age population made up by immigrants from countries included in the 2004 European Union enlargement. Figure (b) shows the 2011 share of the working age population made up by immigrants from countries included in the 2004 European Union enlargement. The four shades of blue correspond to equally sized quartiles of these shares in 2011.

Figure A.3: 2011 EU-2004 immigrant shares by sector



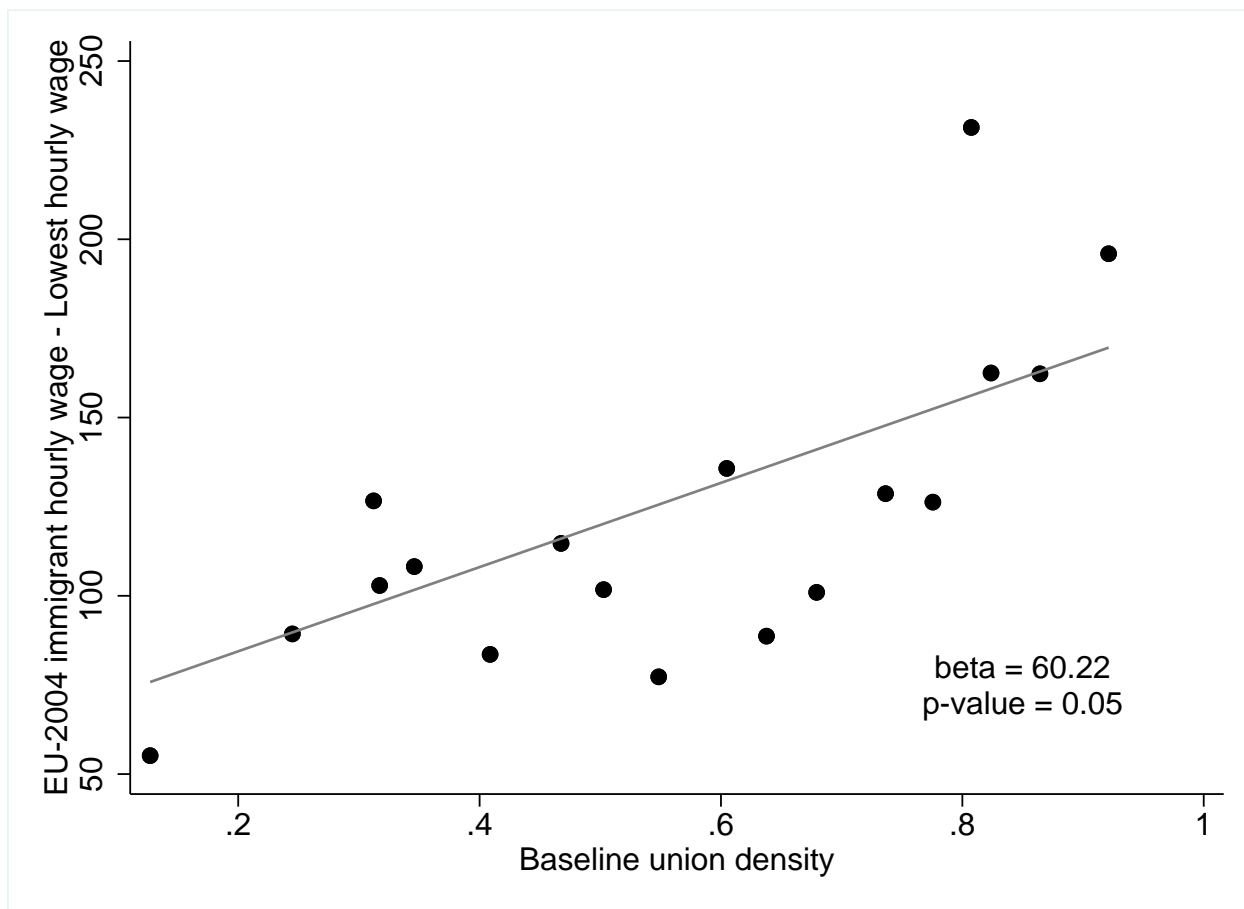
Notes: This Figure shows differences in immigrant shares across sectors.

Figure A.4: Sorting into firms within local labor market by sector cells



Notes: This figure plots the share of immigrants in firms in 2011 against firms' 2003 union density, conditioning on local labor market by sector fixed effects.

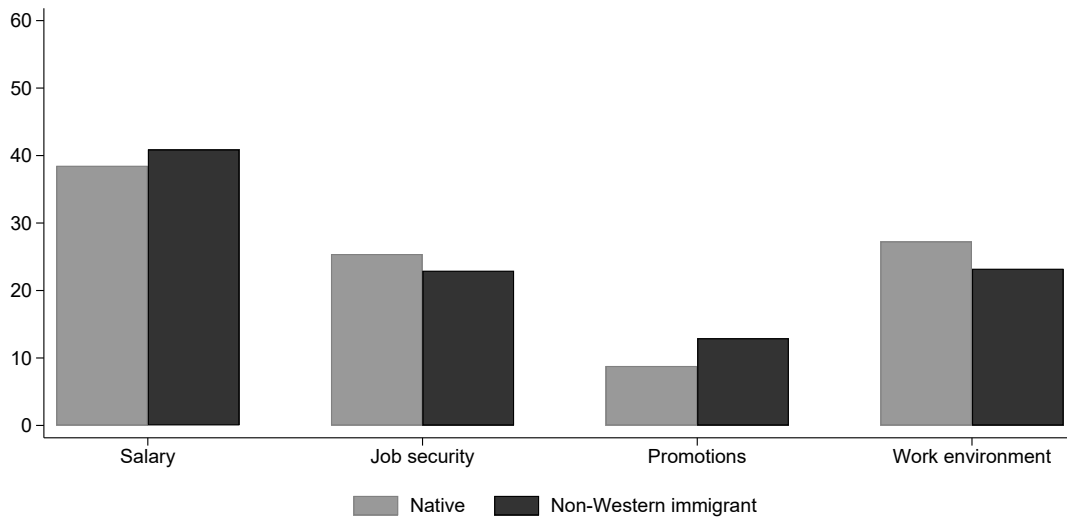
Figure A.5: EU-2004 immigrant wages: Distance from lowest hourly wages in firm-occupation-year cell



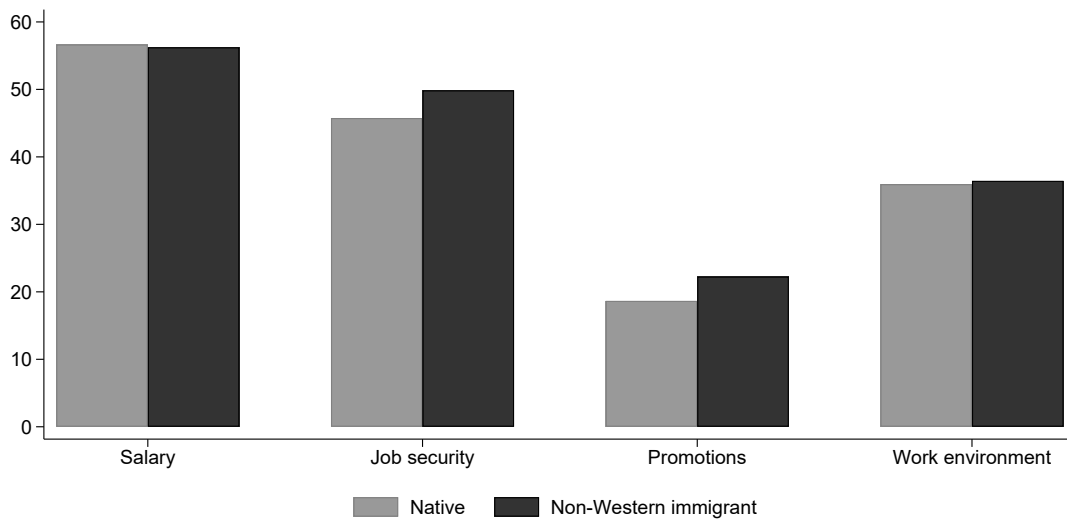
Notes: This figure shows the association between the hourly wages of immigrants from 2004 EU enlargement countries compared to the minimum wage of other workers in each occupation-firm-year cell for the years after 2003. Standard errors are clustered at the firm level.

Figure A.6: Immigrant-native differences in values and perceptions

(a) How do workers value different workplace characteristics?



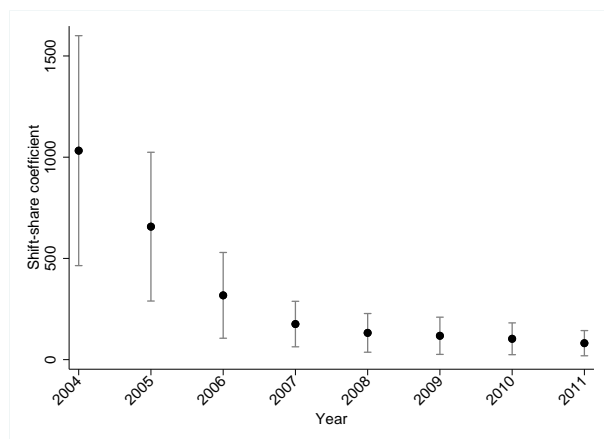
(b) To what extent do workers perceive unions as capable of improving job characteristics?



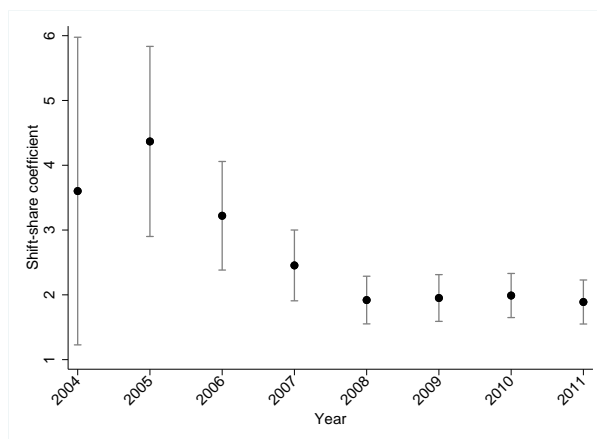
Notes: These figures show results from a survey conducted by Dodini et al. (2024b). Figure (a) reports results from a survey question where respondents were asked to allocate one hundred units across four different dimensions of jobs based on how much they value each dimension. Figure (b) reports results from a survey question where respondents were asked to report the extent that they believe that unions are capable of affecting the same four dimensions of jobs: salary, job security, promotions, and work environment.

Figure A.7: Shift-share estimates for the sorting of new immigrants into firms and local labor markets

(a) Based on pre-share of immigrants from EU 2004 countries in local labor markets

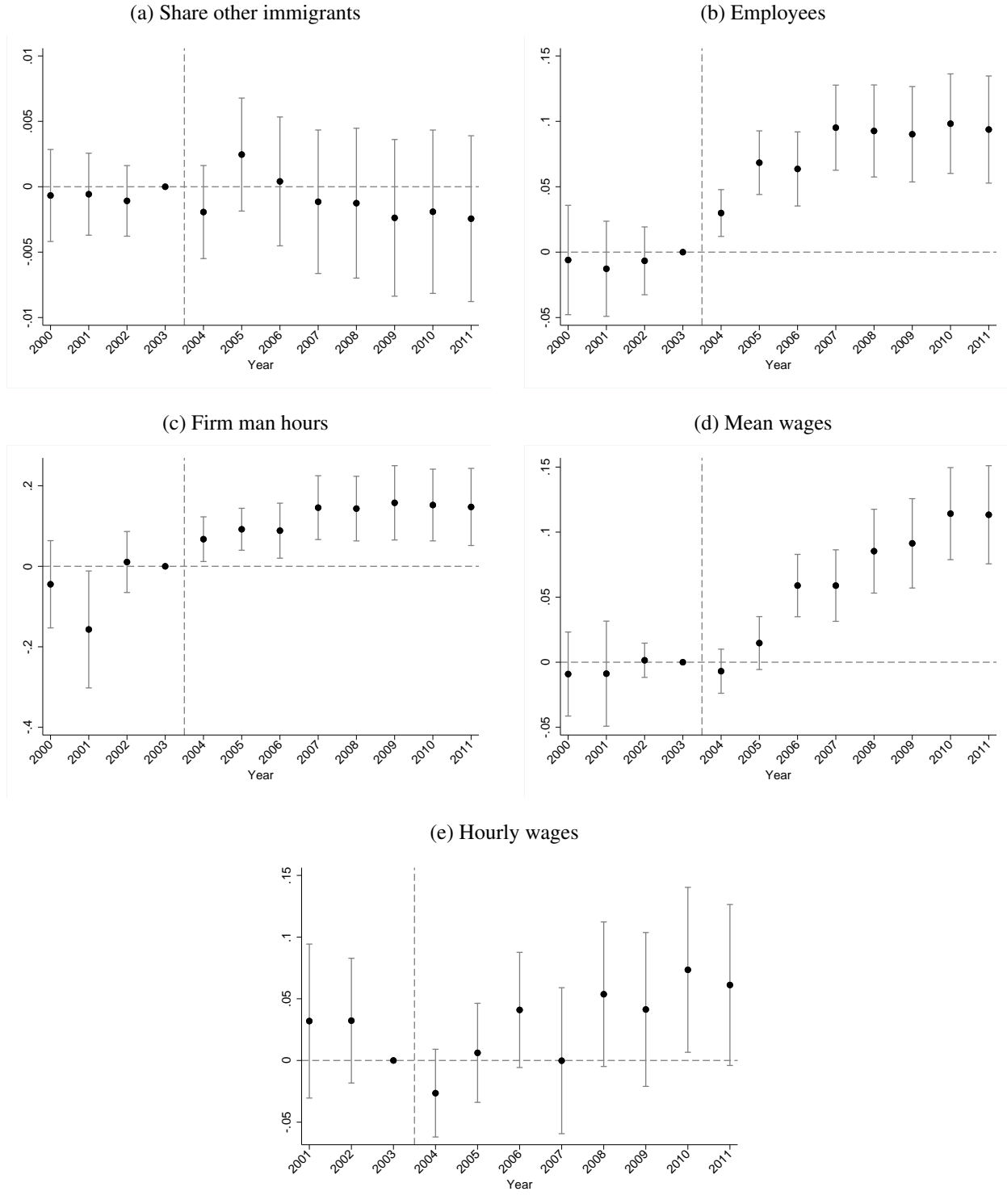


(b) Based on pre-shares of any immigrants in firms



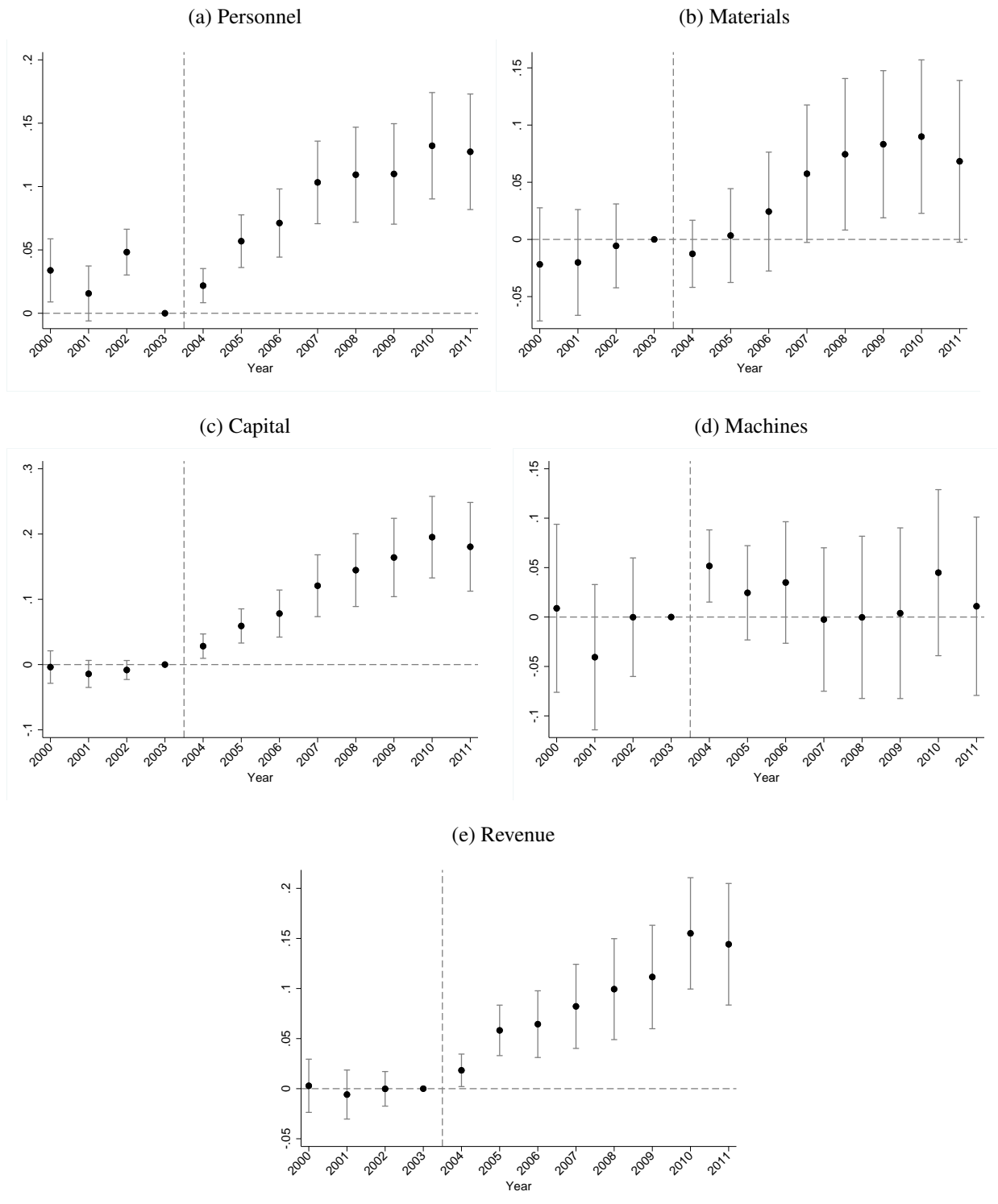
Notes: Figure (a) and (b) report event-study coefficients from regression equations which study how shares of immigrants in 2003 predict the sorting of immigrants from new EU enlargement countries after 2004 into local labor markets (a) and into firms (b). The "shift" in both specifications comes from the annual growth rate in immigrants from EU 2004 countries. The "shares" in Figure (a) are the share of immigrants from 2004 EU enlargement countries in two-digit occupation code by local labor market cells in 2003, while the "shares" in Figure (b) are the overall share of immigrants in each firm, also in the 2003. See Goldsmith-Pinkham et al. (2020) or Jaeger et al. (2018) for methodological discussions concerning the use of shift-share or "Bartik" style instruments.

Figure A.8: Firm input event studies: Minority versus majority firms



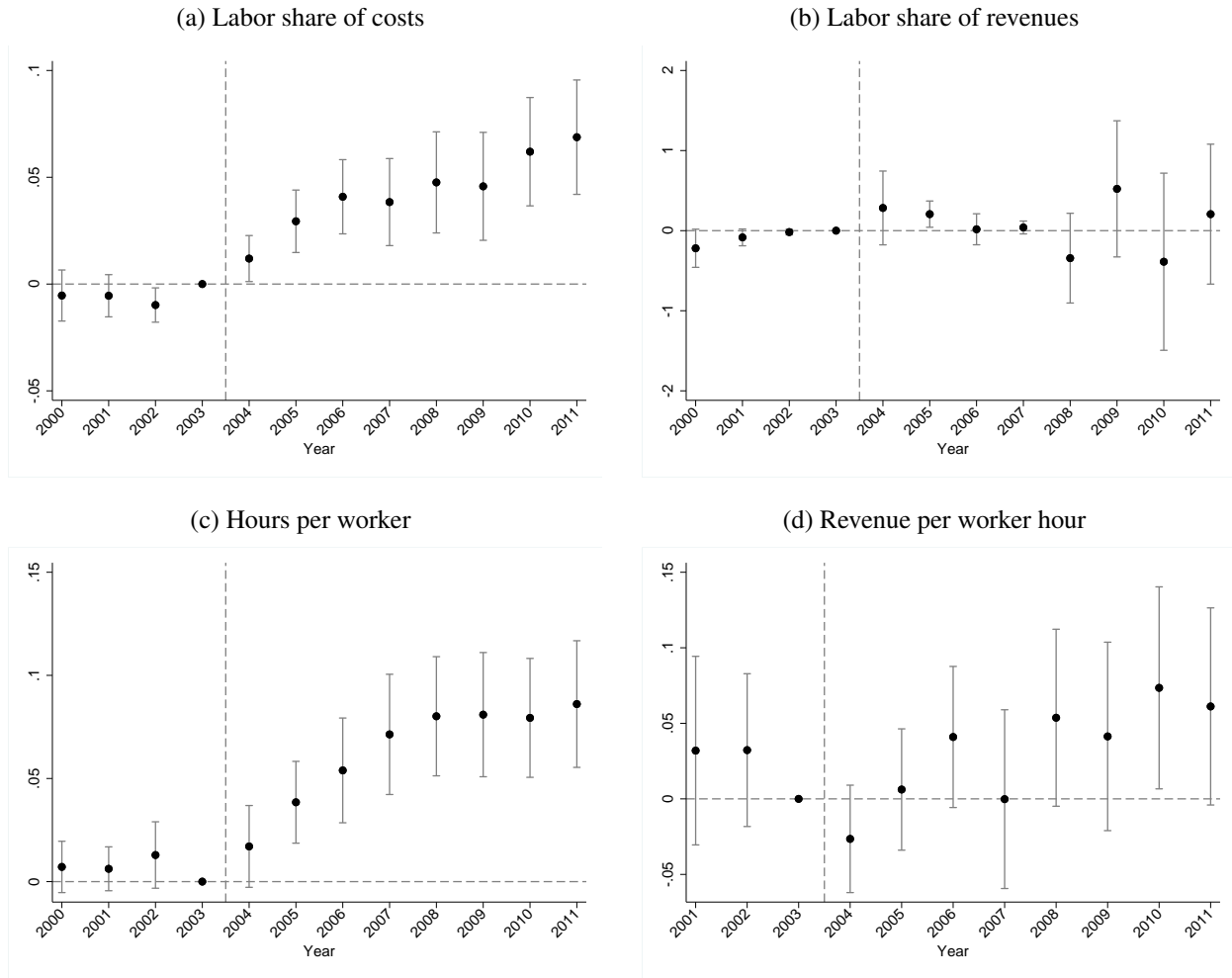
Notes: These figures report differences in the changes in firm inputs between firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 1. Firm inputs are measured as a percent of baseline, with firms no longer operating included in the sample but receiving the value zero.

Figure A.9: Firm input substitution and complementarity: Minority versus majority firms



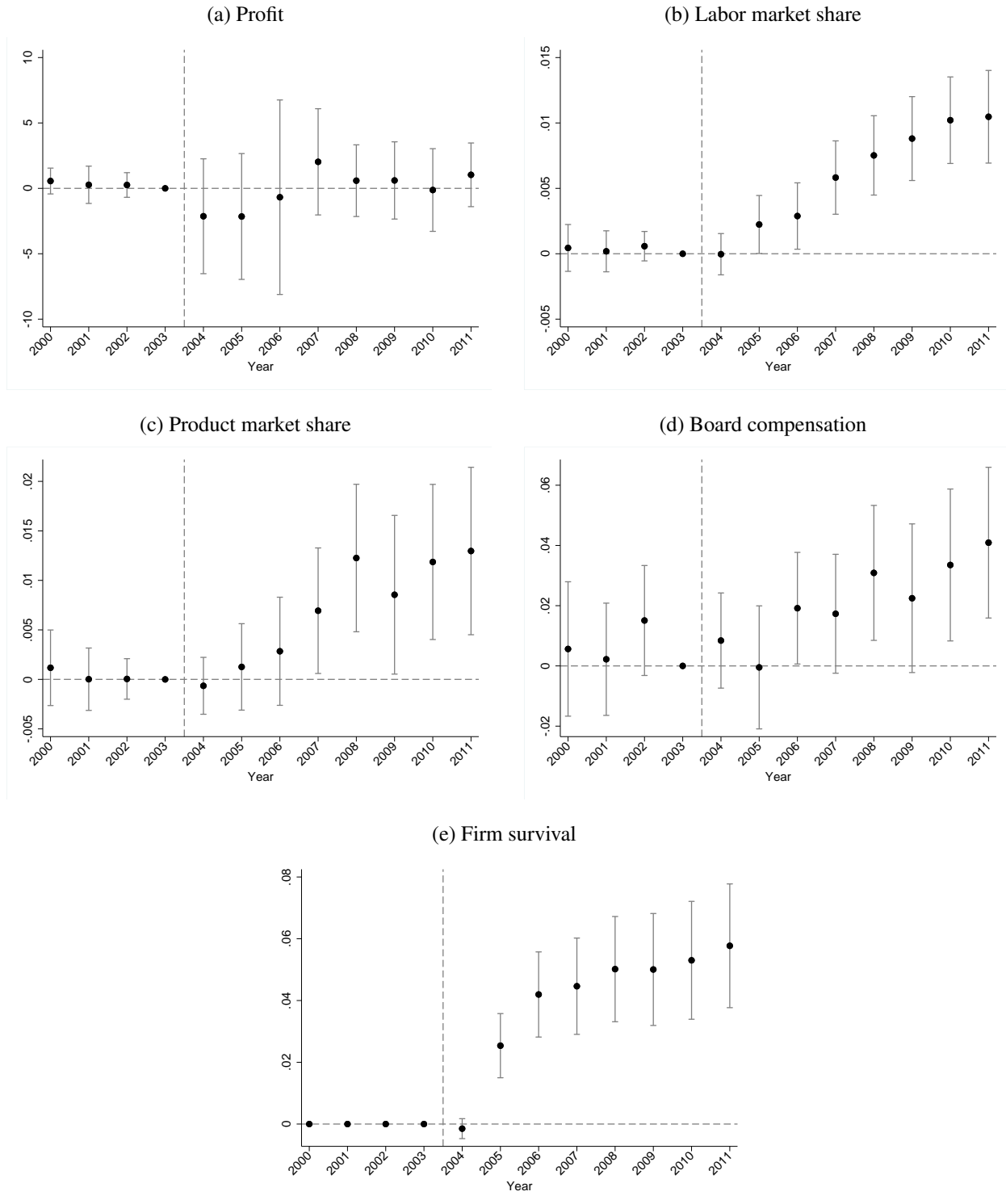
Notes: These figures report differences in the changes in firm inputs between firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 1. Firm inputs are measured as a percent of baseline, with firms no longer operating included in the sample but receiving the value zero.

Figure A.10: Firm labor scale-up: Minority versus majority firms



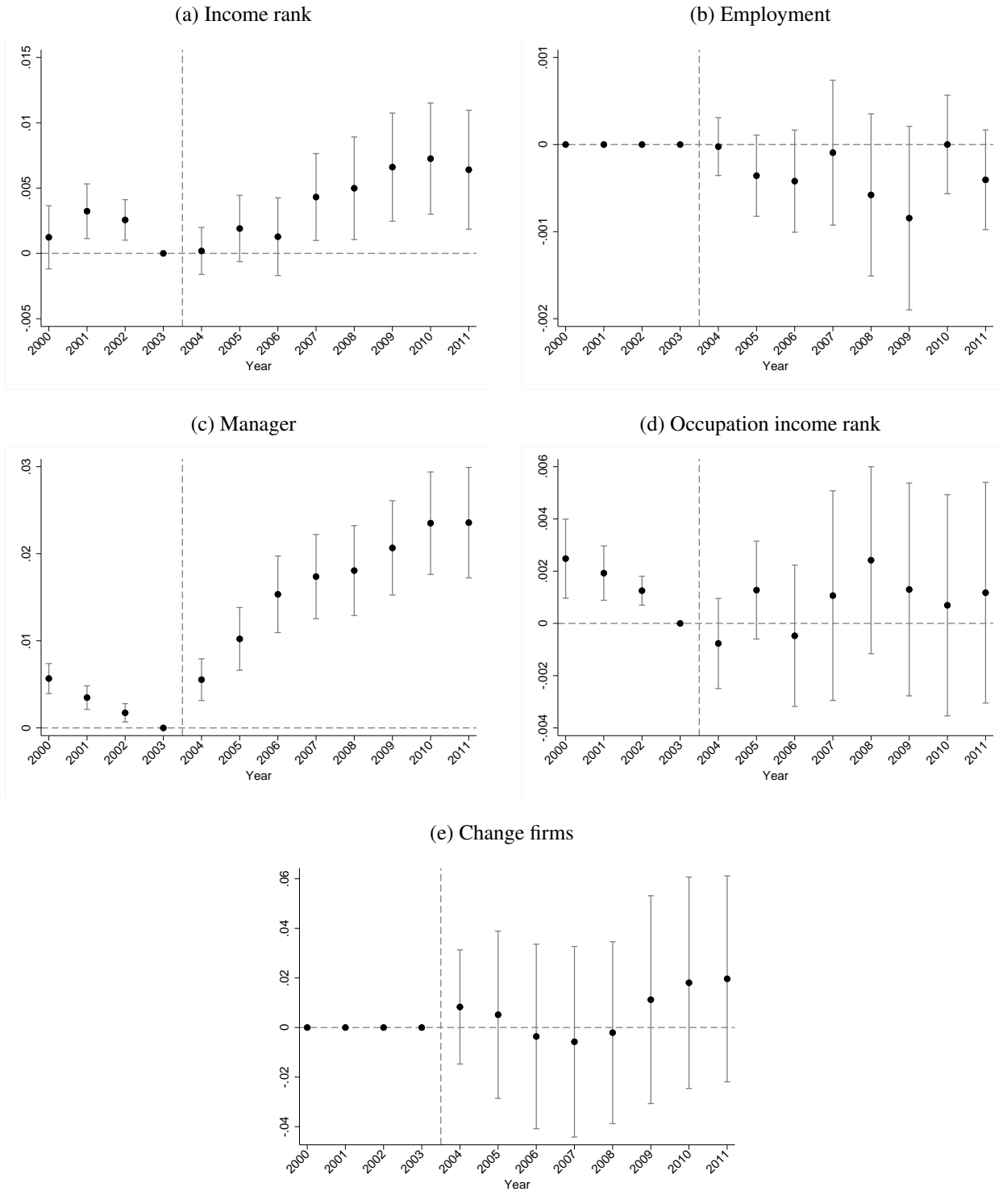
Notes: These figures report differences in the changes in firm inputs between firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 1. Firm inputs are measured as a percent of baseline, with firms no longer operating included in the sample but receiving the value zero.

Figure A.11: Firm output event studies: Minority versus majority firms



Notes: These figures report differences in the changes in firm outputs between firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 1. Firm outputs are measured as a percent of baseline, with firms no longer operating included in the sample but receiving the value zero.

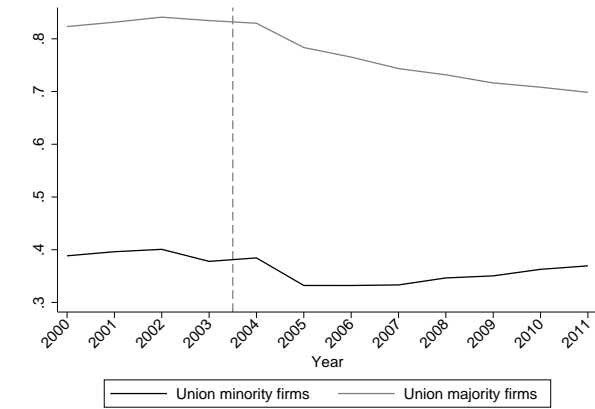
Figure A.12: Event studies - binary union instrument



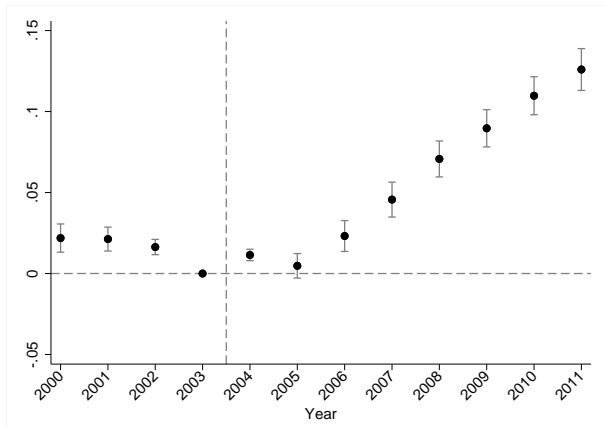
Notes: These figures report differences in the changes in worker outcomes between incumbent workers from firms with a minority versus majority of workers as union members in the baseline period year-by-year, following Equation 3.

Figure A.13: Effects of immigration on union membership

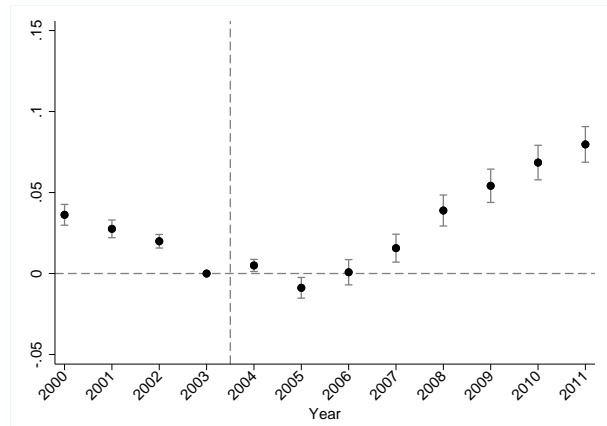
(a) Raw differences in union membership between firm type



(b) Simple event-study



(c) Fully interacted event-study



Notes: These figures show trends in union membership amongst incumbent workers in union minority and union majority firms. Figure (a) plots the raw data. Figure (b) estimates a simple event-study plot, without any controls besides firm effects. Figure (c) estimates an event-study with both sector-by-year and municipality-by-year, and, as in the main specification, with individual and age fixed effects.

Table A.1: Differences between union minority and union majority firms

	Union minority	Union majority	Difference	p-value
<i>Panel A: Firms</i>				
Firm size	41.18 (123.48)	84.71 (244.93)	-43.52	0.00
Profit	3,699.57 (66,145.65)	16,814.86 (544,655.41)	-13,115.30	0.12
Profit per worker	35.39 (524.16)	38.44 (410.32)	-3.05	0.75
Firm FE	-0.05 (0.16)	0.00 (0.14)	-0.05	0.00
Mean sector profit	5,828.21 (56,393.13)	13,688.85 (104,233.76)	-7,860.64	0.00
Mean wages	269.18 (548.88)	283.50 (329.68)	-14.32	0.12
Mean worker FE	-0.15 (0.47)	0.01 (0.35)	-0.17	0.00
Separation rate	0.06 (0.03)	0.04 (0.02)	0.02	0.00
Firms	4,110	5,041		
<i>Panel B: Workers</i>				
Immigrant	0.14 (0.34)	0.11 (0.32)	0.02	0.00
Income rank	0.58 (0.24)	0.70 (0.21)	-0.12	0.00
College degree	0.19 (0.39)	0.22 (0.41)	-0.03	0.00
Age	36.40 (12.12)	41.53 (11.46)	-5.13	0.00
Male	0.57 (0.50)	0.71 (0.45)	-0.14	0.00
Workers	94,970	266,936		

Notes: This table reports the mean and standard deviation of characteristics of firms and workers in our sample in 2003. The sample is restricted to firms which operated each year in the pre-period, had at least fifteen workers in the pre-period and are not in the public sector.

Table A.2: Assessing the potential of unobserved firm characteristics to explain sorting

	Baseline effect (s.e.), [R^2]	Controlled effect (s.e.), [R^2]	Identified set	$\tilde{\delta}$ for $\beta = 0$ given $R^{max} = 1.3 * \tilde{R}$
Minority union	0.011***(0.002)[0.168]	0.012***(0.002)[0.238]	[0.012, 0.012]	-17.285
Non-union share	0.033***(0.004)[0.172]	0.035***(0.005)[0.240]	[0.037, 0.035]	-18.902

Notes: This table reports estimates of immigrant sorting to firms from regressions with and without controls for observable characteristics of firms beyond union density and sector. Following Oster (2019), these are used to estimate the identified set and magnitude of the potential bias required in unobservable firm characteristics required to change the sign of our estimate. See Table 3 in Oster (2019) for additional information on how to interpret these estimates.

Table A.3: Immigrant sorting: sensitivity to specification, sample, and definitions

	Minority union					Non-union share			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Panel A: Worker share from EU 2004 countries, 2011</i>									
EU 2004 share	0.011 (0.001)	0.011 (0.002)	0.011 (0.002)	0.009 (0.002)	0.010 (0.002)	0.029 (0.003)	0.034 (0.004)	0.033 (0.004)	0.028 (0.004)
<i>Panel B: Worker share from EU 2004 accession countries, 2011 – surviving firms</i>									
EU 2004 share	0.014 (0.002)	0.012 (0.002)	0.012 (0.002)	0.009 (0.002)	0.013 (0.002)	0.037 (0.004)	0.036 (0.005)	0.036 (0.005)	0.030 (0.005)
<i>Panel C: Worker share from EU 2004 accession countries, 2011 – of baseline size</i>									
EU 2004 share	0.008 (0.005)	0.012 (0.004)	0.011 (0.004)	0.006 (0.005)	0.007 (0.006)	0.027 (0.012)	0.043 (0.011)	0.042 (0.011)	0.028 (0.015)
Year	Yes				Yes	Yes			
Sector by year		Yes	Yes	Yes			Yes	Yes	Yes
Firm			Yes	Yes	Yes			Yes	Yes
Muni. by year				Yes					Yes
SDID weights					Yes				

Notes: This table reports differences-in-differences estimates of how workers sort into different firms after the 2004 enlargement of the European Union, based on the baseline share of workers at each firm who are union members. Columns (1)-(5) split firms into two categories, minority union and majority union and report the relative difference in EU 2004 immigrant shares in 2011. Columns (6)-(9) report estimates from a specification taking advantage of a continuous measure of baseline union membership rates at each firm. Columns (1) and (6) include only year fixed effects. Columns (2) and (7) include sector by year fixed effects. Columns (3) and (8) correspond to those in our main results and include sector by year as well as firm fixed effects. Columns (4) and (9) include both sector by year as well as municipality by year fixed effects in addition to firm fixed effects. Column (5) reports results from a synthetic differences-in-differences specification which compares minority union and majority union firms; this specification is closest to the specification in Column 1, but assigns different weights to firms following following Arkhangelsky et al. (2021). Panel A includes the full set of firms in our estimation sample, and defines the share (between zero and one) of immigrants from EU 2004 accession countries based on firm size in 2011. Panel B is otherwise similar to Panel A, but restricts the sample to firms still operating in 2011. Panel C defines the worker share from EU 2004 accession countries based on firm size at baseline; since firms can grow or shrink, these outcomes are no longer restricted to the range between zero and one.

Table A.4: Difference in 2003 income rank based on firm type and immigrant status

	(1)	(2)	(3)
Minority union	-0.083	-0.064	-0.058
	(0.000)	(0.000)	(0.000)
p-value	0.000	0.000	0.000
Minority union X immigrant	-0.047	-0.036	-0.032
	(0.001)	(0.001)	(0.001)
p-value	0.000	0.000	0.000
Age-gender FE	Yes	Yes	Yes
Immigrant	Yes	Yes	Yes
Education FE	No	Yes	Yes
Occupation FE	No	No	Yes
Workers	452,646	452,646	439,216

Notes: This table reports the difference in income rank between workers from EU 2004 enlargement countries and other workers across all firms in 2011. All specifications control for age and gender non parametrically and include an indicator variable for immigrant status. Column (2) includes additional controls for one digit education groups. Column (3) includes further controls for occupational codes measured at the three-digit level.

Table A.5: Comparing new workers from EU 2004 enlargement countries to other new workers in union minority firms

	Mean for other new workers	Difference EU 2004 - other	p-value
Age	31.70	0.91 (0.14)	0.00
Male	0.52	0.03 (0.01)	0.00
College degree	0.23	0.06 (0.01)	0.00
Manager	0.04	-0.03 (0.00)	0.00
Occupation income rank	0.49	-0.01 (0.00)	0.00
Hourly wage	213.53	-12.05 (3.26)	0.00
Hours worked	28.41	2.55 (0.13)	0.00
Income rank	0.47	0.03 (0.00)	0.00
Controls		Firm FE	
Workers	109,939	7,193	

Notes: This table reports differences between new workers from EU 2004 enlargement countries and other new workers in union minority firms using data from 2011 and a regression specification with firm fixed effects.

Table A.6: Comparing new workers in union minority firms from EU 2004 enlargement countries to new workers in union majority firms

	Mean for new workers in other firms	Difference between EU 2004 in union minority - other	p-value
Age	36.38	-2.98 (0.15)	0.00
Male	0.59	-0.06 (0.01)	0.00
College degree	0.29	0.06 (0.01)	0.00
Manager	0.05	-0.03 (0.00)	0.00
Occupation income rank	0.56	-0.04 (0.00)	0.00
Hourly wage	247.59	-28.83 (2.72)	0.00
Hours worked	32.21	-0.48 (0.11)	0.00
Income rank	0.58	-0.06 (0.00)	0.00
Controls		Sector FE	
Workers	255,268	7,193	

Notes: This table reports differences between new workers from EU 2004 enlargement countries in union minority firms and new workers in union majority firms using data from 2011 and a regression specification with sector fixed effects.

Table A.7: Union density and immigrant sorting: Union due subsidy instrument

	Effect on firm union density	Effect on firm EU-2004 worker share
Union dues instrument	-13.005 (2.292)	0.030 (0.008)
<i>p-value</i>	0.000	0.000
Firm FE	Yes	Yes
Year FE	Yes	Yes
Sector FE	Yes	Yes
Observations	74,775	74,775

Notes: This table reports the effect of union dues on union density and immigrant sorting. We instrument for union dues using changes in the subsidies to union dues (Barth et al., 2020). The sample uses all firms in our main estimation sample for the years 2000-2011, and fixed effects for firm, year, and sector.

Table A.8: Difference in 2011 income rank between immigrants from EU 2004 accession countries and other workers

	(1)	(2)	(3)	(4)	(5)
<i>Panel A: All firms</i>					
Immigrant	-0.127	-0.047	-0.088	-0.084	-0.057
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
p-value	0.000	0.000	0.000	0.000	0.000
Workers	897,798	897,798	596,210	540,589	505,086
<i>Panel B: Union minority firms</i>					
Immigrant	-0.127	-0.113	-0.071	-0.058	-0.039
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
p-value	0.000	0.000	0.000	0.000	0.000
Workers	70,172	70,172	66,560	70,126	66,522
<i>Panel C: Union majority firms</i>					
Immigrant	-0.174	-0.181	-0.112	-0.075	-0.053
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
p-value	0.000	0.000	0.000	0.000	0.000
Workers	145,946	145,946	141,797	145,896	141,752
Age-gender FE	Yes	Yes	Yes	Yes	Yes
Education FE	No	Yes	Yes	Yes	Yes
Occupation FE	No	No	Yes	No	Yes
Firm FE	No	No	No	Yes	Yes

Notes: This table reports the difference in income rank between workers from EU 2004 enlargement countries and other workers across all firms in 2011. All specifications control for age and gender non parametrically. Column (2) includes additional controls for one digit education groups. Column (3) includes further controls for occupational codes measured at the three-digit level. Column (4) replaces occupation codes with firm fixed effects. Column (5) includes both firm and occupation fixed effects, in addition to demographic and educational controls.

Table A.9: Firm outcomes, 2011 – non-union share instrument

<i>Panel A: Firm inputs</i>					
	Share other immigrants	Employees	Firm man hours	Mean wages	Hourly wages
Non-union share	-0.002 (0.007)	0.319 (0.046)	0.532 (0.136)	0.387 (0.044)	0.306 (0.059)
p-value	0.776	0.000	0.000	0.000	0.000
Firms	9,026	9,026	8,980	9,026	9,026
Observations	18,052	18,052	17,960	18,052	18,052
<i>Panel B: Input substitution and complementarity</i>					
	Materials	Capital	Machines	Total personnel costs	Revenue
Non-union share	0.267 (0.079)	0.536 (0.077)	0.068 (0.105)	0.440 (0.051)	0.490 (0.067)
p-value	0.001	0.000	0.519	0.000	0.000
Firms	9,026	9,026	9,026	9,026	9,026
Observations	18,052	18,052	18,052	18,052	18,052
<i>Panel C: Labor scale up</i>					
	Labor share of costs	Labor share of revenues	Mean worker FE	Hours per worker	Revenue per worker hour
Non-union share	0.247 (0.031)	0.420 (1.319)	0.052 (0.035)	0.282 (0.038)	0.191 (0.077)
p-value	0.000	0.750	0.135	0.000	0.013
Firms	9,026	7,643	4,944	8,980	9,026
Observations	18,052	15,286	9,888	17,960	18,052
<i>Panel D: Firm output</i>					
	Profit	Labor market share	Product market share	Board compensation	Firm survival
Non-union share	1.093 (2.091)	0.039 (0.005)	0.052 (0.011)	0.131 (0.029)	0.205 (0.024)
p-value	0.601	0.000	0.000	0.000	0.000
Firms	9,026	9,026	9,026	9,026	9,026
Observations	18,052	18,052	18,052	18,052	18,052
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on firms based on the baseline share of union membership following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. All estimates are for the full population of firms in the estimation sample, with outcomes coded to zero when a firm is no longer operational. See Table A.3 for effects on EU 2004 share.

Table A.10: Firm outcomes, 2011 – union share instrument (surviving firms only)

<i>Panel A: Firm inputs</i>					
	Share other immigrants	Employees	Firm man hours	Mean wages	Hourly wages
Non-union share	-0.014 (0.007)	0.117 (0.051)	0.363 (0.181)	0.182 (0.038)	0.065 (0.068)
p-value	0.053	0.023	0.045	0.000	0.341
Firms	6,608	6,608	6,589	6,608	6,608
Observations	13,216	13,216	13,178	13,216	13,216
<i>Panel B: Input substitution and complementarity</i>					
	Materials	Capital	Machines	Total personnel costs	Revenue
Non-union share	-0.115 (0.098)	0.290 (0.089)	-0.115 (0.145)	0.191 (0.052)	0.199 (0.072)
p-value	0.242	0.001	0.427	0.000	0.006
Firms	6,608	6,608	6,608	6,608	6,608
Observations	13,216	13,216	13,216	13,216	13,216
<i>Panel C: Labor scale up</i>					
	Labor share of costs	Labor share of revenues	Mean worker FE	Hours per worker	Revenue per worker hour
Non-union share	0.132 (0.025)	0.132 (1.832)	0.054 (0.036)	0.082 (0.038)	-0.219 (0.092)
p-value	0.000	0.942	0.128	0.032	0.017
Firms	6,608	5,620	4,679	6,589	6,608
Observations	13,216	11,240	9,358	13,178	13,216
<i>Panel D: Firm output</i>					
	Profit	Labor market share	Product market share	Board compensation	Firm survival
Non-union share	1.973 (2.934)	0.014 (0.005)	-0.009 (0.010)	0.090 (0.038)	.
p-value	0.501	0.002	0.352	0.018	.
Firms	6,608	6,608	6,608	6,608	.
Observations	13,216	13,216	13,216	13,216	.
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes

Notes: This table reports differences-in-differences estimates of the effects of immigration on firms based on the baseline share of union membership following the specification in Equation 2. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. All estimates are for the only for firms which survive through the year 2011. See Table A.3 for effects on EU 2004 share.

Table A.11: Effects on incumbent workers - binary union split without individual FE

	Income	Employment	Manager	Occupation income	Change
	rank			rank	firms
Union minority firm, 2011	0.007	-0.000	0.027	0.001	0.038
	(0.002)	(0.000)	(0.003)	(0.002)	(0.022)
p-value	0.002	0.184	0.000	0.711	0.090
Individual FE					
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	158,658	158,658	158,658	156,338	158,658
Observations	317,317	317,317	317,317	312,677	317,317

Notes: This table reports differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the base-line measure is in 2003. Standard errors from specifications with errors clustered at the firm level.

Table A.12: Effects on incumbent workers - union share with individual FE

	Income rank	Employment	Manager	Occupation income rank	Change firms
<i>Panel A: With individual fixed effect</i>					
Non-union share, 2011	0.018 (0.005)	-0.001 (0.001)	0.059 (0.006)	0.005 (0.005)	0.038 (0.022)
p-value	0.001	0.130	0.000	0.307	0.090
Individual FE	Yes	Yes	Yes	Yes	Yes
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	137,052	137,052	137,052	132,916	158,658
Observations	274,104	274,104	274,104	265,833	317,317
<i>Panel B: Without individual fixed effect</i>					
Non-union share, 2011	0.023 (0.005)	-0.001 (0.001)	0.068 (0.006)	0.009 (0.005)	0.040 (0.052)
p-value	0.000	0.144	0.000	0.095	0.436
Individual FE					
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	158,658	158,658	158,658	156,338	158,658
Observations	317,317	317,317	317,317	312,677	317,317

Notes: This table reports differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the base-line measure is in 2003. Standard errors from specifications with errors clustered at the firm level.

Table A.13: Effects of immigration on union membership

	(1)	(2)	(2)	(4)
Union minority firm, 2011	0.117 (0.006) [0.003]	0.090 (0.006) [0.004]	0.105 (0.006) [0.004]	0.081 (0.006) [0.004]
p-value firm clusters	0.000	0.000	0.000	0.000
p-value person clusters	0.000	0.000	0.000	0.000
Individual FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Muni. X Year FE		Yes		Yes
Sector X Year FE			Yes	Yes
Workers	156,522	137,052	156,522	137,052
Observations	313,045	274,104	313,045	274,104

Notes: This table reports estimates of the differential effects of immigrant inflows on incumbent workers later union membership in minority union and majority union firms, as classified at baseline. Specification (1) includes age and individual FE. Specification (2) adds additional FE for municipality-by-year interactions. Specification (3) adds additional FE for sector-by-year interactions. Specification (4) includes both interacted sets of fixed effects simultaneously.

Table A.14: Minority versus majority union firms – immigrants versus natives

	Income rank	Employment	Manager	Occupation income rank	Change firms
Natives	0.005 (0.002)	-0.000 (0.000)	0.024 (0.003)	0.001 (0.002)	0.018 (0.021)
Immigrants	0.009 (0.005)	-0.000 (0.001)	0.013 (0.008)	-0.005 (0.004)	0.032 (0.026)
p-value difference (firm)	0.422	0.941	0.154	0.054	0.353
p-value difference (person)	0.342	0.943	0.162	0.024	0.205
Individual FE	Yes	Yes	Yes	Yes	Yes
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	137,052	137,052	137,052	132,916	137,052
Observations	274,104	274,104	274,104	265,833	274,104

Notes: This table reports heterogeneity in the differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. P-values, both with individual and firm level clustering, for the difference in the effects for the two groups are reported.

Table A.15: Minority versus majority union firms – old versus young

	Income rank	Employment	Manager	Occupation income rank	Change firms
Young	0.004 (0.002)	-0.000 (0.000)	0.028 (0.004)	0.003 (0.002)	0.031 (0.021)
Old	0.012 (0.004)	-0.001 (0.001)	0.002 (0.007)	-0.010 (0.003)	-0.036 (0.031)
p-value difference (firm)	0.055	0.688	0.001	0.000	0.006
p-value difference (person)	0.002	0.685	0.000	0.000	0.000
Individual FE	Yes	Yes	Yes	Yes	Yes
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	137,052	137,052	137,052	132,916	137,052
Observations	274,104	274,104	274,104	265,833	274,104

Notes: This table reports heterogeneity in the differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. P-values, both with individual and firm level clustering, for the difference in the effects for the two groups are reported.

Table A.16: Minority versus majority union firms – higher wage versus lower wage

	Income rank	Employment	Manager	Occupation income rank	Change firms
Low/middle wage	0.010 (0.003)	-0.001 (0.000)	0.015 (0.003)	0.005 (0.003)	0.031 (0.021)
High wage	-0.009 (0.003)	0.000 (0.000)	0.044 (0.006)	-0.006 (0.003)	-0.036 (0.031)
p-value difference (firm)	0.000	0.065	0.000	0.024	0.006
p-value difference (person)	0.000	0.081	0.000	0.000	0.000
Individual FE	Yes	Yes	Yes	Yes	Yes
Muni. X Year FE	Yes	Yes	Yes	Yes	Yes
Sector X Year FE	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes
Workers	137,052	137,052	137,052	132,916	137,052
Observations	274,104	274,104	274,104	265,833	274,104

Notes: This table reports heterogeneity in the differences-in-differences estimates of the effects of the effects of immigration on incumbent workers from union minority versus union majority firms following the specification in Equation 4. For all outcomes, the end-line measure is from 2011, while the baseline measure is in 2003. P-values, both with individual and firm level clustering, for the difference in the effects for the two groups are reported.

Table A.17: Production technology across firms

	Minority union firms	Majority union firms
Firm size	0.307 (0.021)	0.369 (0.016)
Assets	0.329 (0.019)	0.406 (0.014)
Machinery	-0.008 (0.008)	-0.020 (0.006)
Materials	0.347 (0.011)	0.257 (0.008)

Notes: This table reports estimates of CES production technology in minority union and majority union firms – as measured at baseline. All firm inputs are measured in logs in the base year (2003).