Labor Market Competition and Its Effect on Firms and Local Communities

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Abstract

This paper isolates the impact of labor market competition on firms, and local communities. A shock to labor mobility from Sweden to Norway caused a substantial increase in labor competition for Swedish firms on the border with Norway. Using unique register data linked across the two countries, we show that Swedish firms respond to the increased competition by raising wages and reducing their workforces. Workers commuting to Norway are positively selected on pre-shock earnings, meaning that Swedish firms disproportionately lose some of their most valuable workers. Exposed firms also experience a decline in value added per worker and an increasing probability of market exit. The contraction and exit of exposed firms reduce local business activity, while affected communities also experience population flight, increased inequality, and increased support for traditional worker protection parties. Norwegian firms benefit through lower labor costs. There is some suggestive evidence of Norwegian workers being displaced. In addition, high-skilled Norwegian laborers lose their skill monopoly, generating wage compression at the top of the income distribution and an improvement in wage equality. We conclude that large shocks to labor market competition, while benefiting certain workers, can place substantial pressure on local firms and have detrimental effects on local communities.

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1 Introduction

As the world is becoming more connected, local businesses find themselves competing in a bigger arena, both within and across countries. While this has long been the case for goods and financial markets, local labor markets are also becoming increasingly integrated with each other. Many legal barriers to labor mobility have been dismantled. Globalization, advanced transportation infrastructure, and rapid technological change have increased worker mobility and exposed local markets to increased labor competition from nearby regions and countries. While there are important arguments for efficiency gains from increased competition, there are also concerns about groups left behind and what the broader implications may be for the overall ecosystem of local communities.

Greater competition for workers can improve job opportunities and raise wages by strengthening workers' outside options. These outcomes are beneficial for workers because they reflect improvements in workers' outside options. However, when competition for workers expands across regions, local firms face higher reservation wages. In order to recruit and retain workers, local firms may be forced to raise wages, increasing labor costs and placing pressure on firm margins. This might require firms to adjust along other dimensions too, including employment levels and workforce composition. In some cases, firms may also need to re-optimize their production technologies, with potential consequences for productivity and value added. Crucially, firms that are unable to absorb these wage cost pressures may be forced to exit altogether.

These firm-level adjustments may have cascading effects on the broader community. In particular, local businesses anchor production, employment, and social life, so firm contraction or exit can reduce local job opportunities, trigger population outflows, reshape inequality depending on which workers are competed over, weaken local tax bases, and shift political sentiment. While improved outside options initially expand workers' opportunities, the potential erosion or loss of local firms may reduce those opportunities over time. Because improved outside options and firm responses may have opposing effects over time, the overall effects of increased labor market competition on firms and communities are theoretically ambiguous and must be assessed empirically.

This paper provides novel evidence on how sharp increases in labor market competition reshape local economic equilibria through firm responses. Exploiting an exogenous increase in workers' outside options, we study how intensified competition for labor affects firms' wage-setting, employment, and survival decisions, and how these firm-level adjustments generate broader effects for local communities. We show how changes in firm behavior translate into broader changes in business activity, inequality, population dynamics, and local public resources, tracing these effects across areas both domestic and foreign. By placing firms at the center of the analysis, the paper offers a unified framework for understanding how geographic labor market integration and competition affect workers, firms, and communities. This question has become increasingly salient as

national authorities consider policies to inject competition into local labor markets.[1]

To address these questions, we exploit an exogenous increase in workers' outside options generated by a sharp and temporary divergence in economic conditions between Norway and Sweden. Between 2005 and 2009, a surge in oil prices and a rapid expansion of Norway's oil sector led to a large and widespread increase in aggregate demand and real wages across the Norwegian economy.[2] This wage boom substantially increased the returns to cross-border commuting from Sweden, despite stable macroeconomic conditions on the Swedish side, and pulled workers into Norway rather than pushing them out of Sweden.

For Swedish communities near the border, the improved job opportunities in Norway represent a sharp increase in competition for labor and vastly improved outside options for their workers. This competition materialized via a surge in new commuting behavior from Sweden to Norway, to which Swedish firms were forced to respond.

For Norwegian border communities, the inflow of Swedish commuters represented both a traditional labor supply shock and an influx of workers who might have been willing to accept a marginally lower wage than resident Norwegian workers. Both of these dynamics may introduce new competition among Norwegian workers for *jobs*.

Crucially, the effects of the commuting response to competition are highly localized: only Swedish communities near the Norwegian border experienced meaningful changes in outside options, and only Norwegian border communities experienced large inflows of commuters. This spatial concentration allows us to implement a difference-in-differences research design by comparing firms and communities in border municipalities to similar non-border municipalities in both countries. Leveraging rich register-based data that track individuals across the border, we examine how this increase in geographic labor market competition affects workers, firms, and local communities in two countries with highly similar institutions and languages.

The main takeaway from this paper is that changes to workers' outside options can have a dramatic and persistent effect on local communities and send ripple effects across all segments of society, even in countries like Sweden, where automatic stabilizers are designed to blunt the impact of local economic shocks.

To support the core takeaway from our analysis, we present five sets of results. First, we use individual-level data linked across the two countries to verify that the macroeconomic shock in Norway induced a response from Swedish workers. During the years of surging wages after 2005, the number of Swedes commuting to Norway doubled, and Swedish commuters constituted as much as 10 percent or more of the workforce in Norwegian border municipalities by 2009. While there is some heterogeneity in terms of which workers respond, the increased opportunities on

[1] See, for example, the 2022 Economic Report of the President of the United States.

[2] Until 2005, Norway's economic performance closely mirrored that of Sweden and the OECD, but it dramatically outperformed the rest of the world during these four years.

the Norwegian side were relevant to Swedes living on the border across all major industries and occupation classes.

Second, we use detailed matched employer-employee data to analyze firm responses on the Swedish side. We show that Swedish firms responded to the increased competition by raising wages relative to value added per worker in an attempt to keep their workers. Despite the higher effective wages, Swedish firms experienced significant reductions in their workforces. Exposed firms also experienced a reduction in value added per worker and an increased risk of market exit. The reduction in value added per worker is consistent with the compositional evidence showing that Swedish firms disproportionately lost higher-earning workers.

Third, we exploit rich municipality-level data to examine spillover effects on local community development. We find that the local communities on the Swedish side experienced an overall reduction in the number of firms present in the area, a large increase in wage inequality, and substantial population flight. The population decline also reduces local tax revenue, though this effect is partially offset by the Swedish fiscal equalization system, which redistributes resources across municipalities.[3] Ultimately, we show that the remaining residents in the local communities adjusted their voting preferences away from the nationalistic and socially conservative anti-immigration party (the Swedish Democrats) and toward the more traditional social democratic parties whose platforms emphasize a strong, active state, worker protection, and redistribution.

Fourth, we use detailed individual-level employer-employee linked data from Norway to show how the Norwegian side is impacted by the influx of positively selected Swedes. We find evidence that some Norwegian workers were displaced following the influx of Swedish workers. In particular, high-earning Norwegian workers faced increased competition and were spatially reallocated toward jobs in neighboring municipalities. On net, this caused wage compression at the top of the income distribution in border municipalities on the Norwegian side. We also show that Norwegian firms benefit through lower labor costs and higher value added relative to labor costs.

Finally, we rule out changes in local goods and services as the primary channel driving our results. We integrate firm- and municipality-level data to examine outcomes for local goods and services, house prices, and firms in the tradable sector, which is less exposed to local demand conditions (see Beaudry et al. (2012)). We find no evidence of changes in total sales revenue for local goods or in house prices in Swedish communities. In addition, firm-level effects in the tradable sector closely mirror our baseline results across all sectors. These findings are important because the effect of increased labor market competition on local goods markets is theoretically ambiguous. Higher earnings from increased commuting could raise local spending, while population decline could reduce demand for local goods and services. The absence of significant changes along these margins indicates that the primary channel through which the shock operates is labor

[3]This transfer system is relatively unique to Scandinavian countries and mutes the impact of the tax revenue reduction on the local communities. In other countries, it is likely that the impacts on local community funding would have been even larger.

market competition and firm responses, rather than shifts in local product demand.[4]

These findings have important implications for the design of community stabilization policies and the timing of policy intervention. In particular, they caution against policies that seek to improve local well-being by intensifying spatial competition for workers without accounting for firm responses. Even in settings with strong automatic cross-municipality redistribution, such as Sweden, financial balancing mechanisms alone appear insufficient to offset the negative effects of labor market shocks when they operate through firm contraction, declining productivity, and business exit. By placing firms at the center of how labor market competition propagates across space, this paper provides a unified framework for understanding the interconnectedness and fragility of local economic systems.

A first closely related literature studies the role of outside options, labor market power, and monopsony in shaping wages and employment (e.g., Schubert et al. (2020); Caldwell and Harmon (2019); Caldwell and Danieli (2024), among others). This work has been essential in documenting how improved outside options raise worker wages and reduce employer market power. However, it has largely focused on worker-level gains and has paid less attention to how firms and local labor demand adjust when competitive pressure increases.

We extend this literature by examining how improvements in workers' outside options affect firm behavior and local labor demand. We document increases in wages alongside reductions in employment and value added per worker, as well as increased firm exit. These firm-level adjustments reshape local labor demand and generate downstream effects on population and inequality, highlighting the importance of examining workers, firms, and communities jointly when assessing the consequences of labor market competition.

Second, our results also relate to research on wage-setting institutions and wage floors (e.g., Neumark and Wascher (2008); Cengiz et al. (2019); Harasztosi and Lindner (2019)). In our setting, the Norwegian boom effectively raises workers' outside wage options across the wage distribution rather than imposing a legislated wage floor on a subset of workers. This distinction matters for firm adjustment. Unlike statutory wage increases, which typically allow firms to substitute across tasks or worker types, broad-based increases in outside options raise competitive wage pressure throughout the firm, limiting substitution and inducing adjustment along scale, productivity, and survival margins. Our findings provide new evidence on how such shocks affect firm behavior and local economic outcomes.

A third related literature examines the effects of cross-border commuting and spatial labor market integration on sending regions. Studies such as Bütikofer et al. (2022), Beerli et al. (2021), and Hafner (2021) analyze settings in which access to larger labor markets expands following the removal of geographic or institutional barriers, documenting wage gains, employment effects, and

[4] A related literature, including Autor et al. (2016) and Autor et al. (2021), examines the long-run effects of trade exposure on U.S. regions. Consistent with this work, changes in local goods markets are unlikely to account for our findings.

population responses. This literature largely focuses on settings where access to external labor markets is newly created, emphasizing worker-level outcomes and firm responses to labor supply changes on one side of the border.[5]

Our setting differs in two fundamental ways. First, labor mobility and cross-border commuting were already well established prior to the shock we study, so adjustment operates through intensified competitive wage pressure rather than the opening of previously closed markets. This makes our results more widely comparable across economic and political contexts because local labor demand shocks and developing wage differentials are incredibly common phenomena across cities, states, and nations (e.g. across cities within a metro area or across US states).

Second, we explicitly trace firm behavior—wage setting, productivity, and exit—and show how firm responses transmit new labor market competition to broader community outcomes. Related work by Dicarlo (2022) documents firm exit on the sending (Italian) side following increased exposure to higher-wage labor markets after the same Swiss reform mentioned above, but does not link firm-level adjustments to population dynamics, inequality, or outcomes on both sides of the border. By contrast, we study the same shock in both sending and receiving regions and connect firm behavior directly to community-level consequences. Taken together, these features allow us to characterize the adjustment dynamics of spatial wage gradients across three units—workers, firms, and communities—and across both sending and receiving regions.

In a fourth strand of literature, we expand the political economy literature on local voting and political polarization (some newer examples in the literature include the role of media in Djourelova et al. (2025); economic distress in Gyöngyösi and Verner (2022); migrants in Steinmayr (2021); austerity in Fetzer (2019); exposure to import competition from China in Autor et al. (2020); and moral values in Enke (2020)). Increased labor market competition that affects communities on several key dimensions such as population growth, business activity, tax revenues, and inequality, is likely an important policy parameter for local parties. We advance the literature by identifying shocks to labor market competition as an important determinant for local political attitudes, providing a fuller understanding of the relationship between changes to local economic conditions and political cohesion and polarization.

Finally, our analysis relates to the large literature examining the effects of immigration and labor supply shocks on native workers (e.g., Card (1990); Borjas (2003); Ottaviano and Peri (2012); Foged and Peri (2016); Dustmann et al. (2016)). Consistent with this literature, we find moderate wage declines and employment reallocation among native workers in receiving regions.[6] Our contribution is not to re-evaluate average native wage effects, but to show how similar shocks

[5] Beerli et al. (2021) examine the effect of lifting restrictions on cross-border workers on Swiss firms and workers as well as innovation, while Hafner (2021) examines the experience of firms and workers on the French side of the same Swiss reform.

[6] A recent development in this literature takes into account mobility patterns across locations (Borusyak et al., 2022). In our empirical strategy, we follow this convention, in which the migration weights are functions of the border contact between municipalities and zero for all others.

propagate through firms and generate heterogeneous and persistent community-level outcomes, particularly on the sending side of integrated labor markets.

The key results of this paper underscore the vulnerability of local communities to relatively modest shocks that alter workers' outside options—shocks that can arise from a wide range of policy and economic changes, including the construction of transportation links, the establishment of new businesses in specific regions, and changes in competition or migration policies. These findings have important implications for the design of community stabilization policies and the timing of policy intervention. In particular, they highlight that policies that increase spatial competition for labor can generate important adjustments by firms and local communities that extend beyond their direct effects on workers.

2 Institutional Background

2.1 Conceptual Motivation

Labor market competition is often viewed through the lens of workers. Better outside options strengthen workers' bargaining positions, raise wages, and reduce firms' ability to pay wages below workers' marginal revenue products. Yet the ultimate consequences of increased labor market competition depend not only on how workers respond, but also on how firms adjust. Because firms determine local labor demand, production, and business activity, their responses transmit changes in workers' outside options throughout the local economy. Appendix C develops a simple framework describing the transmission mechanism linking workers' outside options, firm behavior, and community outcomes. The framework traces how improvements in workers' outside options affect firms' wage-setting, profitability, employment, and survival decisions, and how these firm responses ultimately propagate to local community outcomes. It thereby clarifies the economic mechanisms underlying the empirical predictions examined throughout the paper. We summarize the main points below.

Labor market competition is typically encouraged from the perspective of individual workers because greater competition is expected to raise wages and reallocate rents from employers to workers, bringing wages closer to workers' marginal revenue products. This logic has become particularly salient in recent years, as a growing body of evidence documents rising employer concentration and increasing labor market power across many sectors and regions (Card, 2022; Azar et al., 2020; Dodini et al., 2024).

This worker-centric perspective, however, captures only part of the transmission mechanism. Firms are not passive intermediaries; they are the primary locus of production and a central component of local economic and social life. When workers' outside options improve, firms must respond by raising wages and reducing wage markdowns. This reallocates surplus toward workers while compressing firm margins and reducing profitability. As long as firms can absorb the shock by compressing wage markdowns, firms need not adjust along other margins. However, once workers' outside options exceed the competitive wage (workers' marginal revenue product),

firms can no longer adjust solely through lower markdowns. They must instead adjust along other margins and, if profitability falls below the level required to sustain operations, may ultimately exit the market.

We begin by considering how wages are set at the firm level. Most firms operate in labor markets characterized by imperfect competition, and firms, therefore, possess some degree of wage-setting power (Card, 2022). This allows firms to pay wages below workers' marginal revenue products, generating labor market rents (e.g., Dodini et al. (2024)).

In theory, when workers experience an exogenous improvement in their outside options, wage determination at their current firm is directly affected. Under wage bargaining, outside options raise workers' disagreement payoffs and bargaining power; under wage posting, firms face a tighter participation constraint. In both cases, firms must raise effective wages (conditional on their productivity) to retain workers, even in the absence of realized job-to-job transitions. The resulting compression of wage markdowns reduces profitability and, if firms can no longer absorb the increase in labor costs through lower profits, may trigger adjustments along other margins or ultimately lead to firm exit.

A unique feature of our setting relative to the existing outside options literature is that we have an exogenous improvement in the outside option that applies flexibly to workers across the earnings and occupation distributions. This means that the change in outside options affects a broad range of workers and, therefore, a wide variety of firms.

Firms represent a key feature of the social fabric of local communities, and any effect on the size, performance, viability, and existence of firms will likely have ripple effects across the community. Specifically, in our setting, Swedish firms' ability to respond to (and survive) increased competition from Norway through wage offers will dictate workers' future employment decisions to remain at Swedish firms, commute to the Norwegian side, or relocate to other areas in Sweden. If firms downsize or close, some workers may relocate elsewhere to seek employment. These dynamics may also increase inequality across the earnings distribution, depending on which workers experience gains to their outside options. Population decline would affect local tax revenues, and residents' political sentiments might shift in response. The size and direction of the effects of these phenomena on local community development are important empirical questions that have not been explored through a unified empirical framework before. We investigate this in detail.

Regarding the side that is generating the new competitive wage (Norway), the shock may induce workers from Sweden to switch to these more lucrative labor markets, leading to an influx of workers to the new market. These incoming workers may be willing to accept a lower wage than the prevailing market wage because it is still an improvement over their options on the Swedish side. Total labor supply to the new market shifts outward and lowers wages in partial equilibrium if workers are substitutable. This allows Norwegian firms to substitute marginally less expensive Swedish workers in place of more expensive Norwegian workers, so long as they are equally

productive. This increases firm surplus and raises displacement risk for Norwegian workers.

2.2 Cross-Border Commuting

The border between Norway and Sweden is 1,619 kilometers long and represents the longest land border in Europe. The border follows the drainage divide in the Scandinavian mountains between the rivers that flow to the Norwegian Sea and Skagerrak and the rivers that flow to the Baltic Sea (with a few exceptions).

Both Norway and Sweden are members of the Schengen Area, which means that there are no immigration or passport controls along the border. However, only Sweden is part of the European Union. There are, therefore, customs checks between Norway and Sweden all along the border to enforce different VAT requirements, excise taxes, and tariffs or quotas on certain goods and services.[7] Since 1959, a shared surveillance agreement has allowed customs officers from each country to act on behalf of the other. There are 41 road crossings and 4 railway crossings between the two countries.

Swedish citizens are particularly mobile within the Nordic region, and 80 percent of all cross-border commuting in the Nordic region is driven by Swedish citizens commuting to Denmark and Norway. Both Norway and Denmark offer large labor markets with high wages a short distance from the Swedish border. The commuters tend to be young, highly educated, higher-income, single, and male, often seeking higher wages and improved job opportunities. Commuters are found across all industries. Very few Norwegians commute to another Nordic country for work (less than 2,000). The average commuting stint to Norway is 3.8 years. For those working exclusively in Norway, the average commuting stint is 2.3 years.[8]

Cross-border commuting has been an integral part of the pan-Nordic competitiveness strategy for several decades. Since 1954, individuals have been allowed to move between countries without work permits, and even before then, there was a substantial exchange of labor across the border.[9] In terms of institutional barriers, Sweden and Norway are very similar with respect to labor market design, education systems, and welfare policies. In addition, the Swedish and Norwegian languages are closely related, and there are few language barriers to working in the other country.[10]

Tax and welfare systems in the Nordic region require workers to pay taxes and receive welfare benefits—such as pensions, unemployment benefits, parental leave, and sick leave—in the country

[7] Even before entering the Schengen area in 2001, there were no passport controls between Sweden and Norway due to the countries' participation in the Nordic Passport Union. That the flow of goods differs from the flow of labor is a strength of using this setting to study labor market competition.

[8] See this report from Nordic Labour Journal.

[9] Even with open borders, mobility frictions can still hinder the equalization of wages and labor supply across national boundaries. Factors such as migration costs, home country bias, and commuting distances all pose significant challenges. For instance, in the US, experiments show that workers are willing to forgo 16-19% of their income to avoid relocating across state borders, all else being equal (Wilson, Forthcoming). Similarly, despite fewer legal or administrative obstacles, wage differentials persist across various international borders, such as those between Switzerland and Germany, Sweden and Denmark, France and Germany, and France and Spain (e.g. Dicarlo (2022); Beerli et al. (2021); Bütikofer et al. (2022)).

[10] As an example, Norwegian law allows university teaching in Swedish.

where they are employed. This applies to all cross-border commuters, with one exception: workers who live in a border municipality on one side of the border and work in a border municipality on the other side pay income taxes in their country of residence.

2.3 The Norwegian Economic Boom

After decades of relatively parallel per capita GDP growth trends between Norway and Sweden, Norway experienced a disproportionate increase in GDP between 2005 and 2009. This divergence was not due to poor economic performance in Sweden but rather due to Norway significantly outperforming the rest of the OECD. As shown in Panel A of Figure 1, Norway's per capita GDP grew over 30 percent faster than Sweden's during this period, after which the relative growth rates of both countries stabilized. The primary drivers of Norway's accelerated growth were the sharp rise in oil prices from 2004 to 2008 (see Panel A of Appendix Figure A1) and the rapid expansion of its oil sector (see Panel B of Figure 1). This growth was particularly concentrated in Norway's western and northern regions and positively influenced the broader economy by increasing aggregate demand.

Our analysis focuses on the border areas of western Sweden and eastern Norway and excludes workers and firms in areas with high employment in Norway's oil sector. Although oil played a central role in Norway's macroeconomic expansion, it accounted for only 7 percent of total employment by the end of our study period (von Brasch et al., 2018). Oil-related employment was highly concentrated along the western coast, with the highest shares in municipalities such as Sola (16 percent) and Stavanger (14 percent), and was largely absent from the eastern border regions relevant for our analysis (Ekeland, 2017). Appendix Figure A2 Panel A illustrates this spatial concentration of oil-adjacent employment. Importantly, Panels B and C show that earnings growth in oil-adjacent sectors and overall was strong across a broad set of municipalities rather than concentrated in oil-intensive regions or near the Swedish border, indicating that the labor demand shock originating in oil translated into widespread growth across the country. While the earnings growth was slightly stronger on the west and northern coasts, the spatial patterns support the idea that our control group closer to the Swedish border (described in Section 4.1) provides a plausible counterfactual for border municipalities had they not experienced the large influx of Swedish commuters. Our treatment and control areas were not differentially composed of oil-adjacent industry employment at baseline and were not disproportionately boosted by oil-specific employment or revenue growth after 2004. Our identification strategy controls for broad macroeconomic shocks at the national level and the use of detailed synthetic control methods produces robust results. Moreover, our results are qualitatively robust to the inclusion of Bartik-style industry shock controls. Importantly, our identification strategy on the Norwegian side does not require that the oil-price shock affect all parts of Norway equally. Rather, it requires only that, in the absence of the influx of Swedish commuters, the treatment and control areas would have experienced similar growth effects from the oil-price shock. We discuss this in detail in Section 4.1.

The economic boom in Norway during 2005-2009 led to a sharp decline in unemployment (Figure 1, Panel C) and a substantial rise in wages (Figure 1, Panel D). This wage growth was not confined to specific occupations or industries but applied broadly across all job classes in the country. One key factor behind this widespread wage increase is Norway's national sectoral collective bargaining system, where the export-oriented industrial sector negotiates wages first (Bhuller et al., 2022). As a major member of this sector, the oil industry played a pivotal role in driving favorable wage agreements over this time period. Other sectors typically use the industrial sector's outcomes as benchmarks for their own negotiations, resulting in significant wage spillovers whenever the industrial sector performs well (Dale-Olsen, 2024). Additionally, the oil sector accounts for 25% of Norway's GDP and 35% of state revenues. Although petroleum revenues are gradually phased into the economy through specific fiscal rules, the 2005-2009 boom likely stimulated demand across all sectors via increased government spending and increases in aggregate demand. By the end of this period, the unemployment rate gap between Norway and Sweden had widened significantly, and the within-occupation wage gap across the two countries had grown dramatically.

Norway's rapidly expanding economy created sharp increases in labor demand for Norwegian firms, making it advantageous for Swedes to commute across the border for work. This labor demand shock can also be viewed as a shock to labor market competition in Sweden, as Swedish firms–particularly in municipalities near the Norwegian border–faced intensified competition for domestic workers. The subsequent inflow of Swedes into the Norwegian economy represents a more traditional labor supply shock to Norwegian border municipalities.[11]

Exchange-rate movements reinforced these incentives during the main phase-in period. As shown in Panel B of Appendix Figure A1, the Norwegian krone appreciated modestly relative to the Swedish krona between 2004 and 2009, further increasing the relative value to earnings received in Norway.

Previous research has demonstrated that Swedish workers are highly responsive to economic opportunities in neighboring countries (e.g., Bütikofer et al. (2022)). Norway's economic boom during the 2005-2009 period generated significant competitive pressures favoring Swedish workers, who responded by vastly increasing their rates of commuting across the border. To provide preliminary evidence of this response, Figure 2 shows the number of Swedes working in Norway from 2001 through 2014.

Panel A illustrates a stable inflow of commuters from Sweden to Norway between 2001 and 2005, with an annual average of 30,000 workers crossing the border for work. However, this number rapidly increased starting in 2005, reaching approximately 60,000 by 2009. The worker

[11]The effects of the financial crisis and Great Recession were very mild in Scandinavia and only impacted the markets for a few quarters in 2009 and 2010. This is after the major oil shock in Norway, and after the change in labor supply and demand on the border had completed its phase-in period. Therefore, it is unlikely that the effects we observe are driven by the financial crisis. Additionally, our results are qualitatively robust to controlling for Bartik-style exposure to industry-specific shocks.

flows depicted in Figure 2 strongly align with the divergent economic trends between the two countries shown in Figure 1. Panel B shows changes in commuting as a share of workers in our treatment and control areas introduced in Section 4.1.

Panel C highlights the percentage point change in the share of workers commuting from Sweden to Norwegian border municipalities between 2005 and 2013, revealing sharp increases.[12] Panel D shows the municipalities on the Swedish side of the border from which commuters originated, indicating the percentage point change in the share of total workers commuting into Norway. Together, these figures demonstrate that the majority of commuting increases occurred between municipalities directly on the border. Due to the tax rules in both countries, these Swedish commuters on the border pay income taxes in Sweden rather than Norway.

Conceptually, the fact that more Swedes began commuting is an indication that the wage differential surpassed their reservation wage net of commuting costs. Alongside this action, as long as Norwegian firms can pay marginal Swedish commuters less than their Norwegian counterparts, Norwegian firms would be happy to hire equally productive commuters, even if that means paying a compensating differential above what a Swedish firm could pay.

3 Data

3.1 Overview

Our primary data come from administrative registers at Statistics Sweden and Statistics Norway, covering all individuals aged 16 to 65 from 2001 to 2014. The demographic data include age, gender, marital status, family composition, education, and residence. Socioeconomic data cover employment, occupation, industry, annual earnings, and social welfare participation.

We link our individual-level data to firms using detailed employer-employee registers, providing information on the firms where individuals work. This includes data on the firm's value-added, productivity, size, location, industry, and sector. The data cover the private sector, so firm performance information is unavailable for public sector establishments.

We utilize a unique agreement between Sweden and Norway that created a database on worker flows and commuting between the two countries in an effort to better coordinate tax administration. This data, covering 2001-2013, provides individual-level information on Swedish residents' labor market activities in Norway, including employment, earnings, industry, and municipality of work. These data are linked to our main data via social security numbers shared between the two national statistical agencies.

Our data enable us to analyze how the initial shock to the cross-country earnings gap and the subsequent labor supply shock affect individuals, firms, and local communities in both countries. Appendix Table A1 presents summary statistics for individuals (Panel A), local communities

[12] Some municipalities in our control group on the Norwegian side exhibit significant changes due to large ski resorts, indicated by red dots. Swedes who work in these resorts during the ski season while maintaining their primary residence in Sweden are counted as commuters. Excluding these municipalities from our analysis does not affect the results. High commuter shares in certain towns in central Norway are due to their particularly small base populations.

(Panel B), and firms (Panel C) on the Swedish side, while Appendix Table A2 provides the same for Norway.[13] Since we use a difference-in-differences design, we do not require treatment and control groups to be identical, only that they would have trended similarly in the absence of the shock (something we study in great detail in Section 4.2).

3.2 Sample Construction

In theory, the growing Norwegian economy created improved labor market opportunities accessible to all Swedes willing to commute, exposing all of Sweden to the Norwegian labor market shock. The main challenge with our analysis is, therefore, to identify observational units in Sweden that are more or less exposed to this shock. This will allow us to define a clear set of treatment and control units through which we can then disentangle the causal effect of increased competition.

To define treatment and control units, we rely on prior research showing that commuting costs rise sharply with distance (e.g., Le Barbanchon et al. (2021)) and that local labor market shocks in Scandinavia typically do not have spatial spillover effects that extend far geographically (e.g., Bütikofer et al. (2022)). For context, the municipalities located on the border with Norway have travel times to the Norwegian border of less than 30 minutes, while the municipalities just to the east have typical travel times to the border of 45-90 minutes. The commuting time from the control municipalities to the border is more than four hours. This means that being in a municipality away from the border strongly reduces the likelihood of responding to Norwegian wages (and we confirm in Figure 2 that cities away from the border had much smaller responses, if any at all). Thus, areas closer to the border are likely more impacted by the shock than those farther away, providing a natural basis for categorizing treatment and control units. Beyond the border municipalities, commuting costs become sufficiently high that municipalities are effectively unexposed to Norwegian labor market conditions, so more complex distance-based measures of exposure add little additional information.

To assess the impact of increased competition, we compare Swedish (Norwegian) municipalities bordering Norway (Sweden) with those that do not. In our main specification, our treated municipalities are border municipalities in populous counties (the largest geographic subdivision of Sweden) on the southern end of the country, which excludes the very sparsely populated northern municipalities. Control municipalities are in counties adjacent to the treatment counties, creating a spatial buffer to avoid spatial spillover effects from border municipalities. These control areas are geographically close to the main treatment municipalities, but still sufficiently far from the border to not be directly affected by the shock. Figure 3 visually shows these municipalities for Norway (Panel A) and Sweden (Panel B). Our main analysis includes 65 Swedish municipalities and 95 Norwegian municipalities from 2001 to 2014. Across both panels, the treatment and control groups

[13] Note that firm statistics are not weighted by size, so individual and firm-level statistics may differ. In our firm-level estimates, we use the universe of firms for every outcome for which we have data and note that information on firm value added is not available for some firms in Sweden for whom we have worker-firm matches in the labor registers. Restricting the sample only to firms with complete data has no impact on our results.

closely follow the commuting patterns in Panels C and D of Figure 2.

The municipalities used as controls in our baseline estimation are non-randomly selected. To ensure this does not influence our findings, we present sensitivity analyses for the municipality-results in a dedicated Appendix B. In that appendix, we randomly alter the set of non-border control municipalities 200 times, keeping the total number of control municipalities constant. We also show results when including all non-border municipalities as controls. Additionally, we explore how our estimates change by redefining and expanding the treated areas. We also perform a placebo treatment exercise. Finally, we present results using a synthetic difference-in-differences design.[14] Taken together, these sensitivity analyses show that our findings are robust across a wide range of treatment and control group definitions.

3.3 Outcomes in Sweden

Firms: We begin at the firm level by examining how firms respond to increased labor market competition from Norway. We focus on a set of outcomes that directly capture firms' economic adjustments: earnings, the value-added–earnings gap (defined as value added per worker minus average earnings), employment, value-added, productivity, and the risk of firm exit.[15] Together, these measures allow us to assess how increased competition for labor affects firms' cost structures, scale of operations, and viability. By examining value-added–earnings gap alongside productivity proxies and employment, we are able to distinguish between adjustments that operate through higher labor costs, reduced labor demand, and changes in firm performance. Firm exit captures the extensive-margin response, reflecting whether competitive pressure leads some firms to contract beyond the point of survival.

Local Communities: We then examine how these firm-level responses are reflected in outcomes at the community level. We focus on three broad margins of adjustment: labor market outcomes, distributional effects, and community dynamics. Labor market outcomes include employment in Norway, employment in Sweden, overall employment, unemployment benefit receipt, and earnings, capturing how changes in local labor demand translate into worker opportunities and income. Distributional effects are measured using the values of contemporaneous percentiles of the earnings distribution within each municipality (p10, p50, p90) for those in the employment register, allowing us to assess how the shock reshapes inequality within affected communities. Community dynamics include population, the number of workers, and the number of operating firms, which together reflect changes in local economic activity and the longer-run viability of communities ex-

[14] To construct the synthetic difference-in-differences estimate, we match regions based on their outcomes during the pre-shock period (2001-2004) and adjust these outcomes for demographic factors (age, gender, education) and labor market activity (share of workers in Sweden's main sectors: manual, services, and public). We include all non-border municipalities in Sweden, excluding those in the treated group's county and the three largest metropolitan areas (Stockholm, Gothenburg, and Malmö), in the donor pool. Results remain consistent when residualizing on other factors or relaxing donor pool restrictions.

[15] We cannot directly estimate firms' wage markdowns because we do not observe workers' marginal revenue products. We therefore examine the value-added–earnings gap. While this is not a structural measure of the wage markdown, it provides a descriptive measure of how worker earnings evolve relative to firm-level value added per worker, and theory suggests the two will move together under competition.

posed to increased labor market competition. In addition, we examine total municipal income, tax revenue, social support payments, and per capita municipal income to capture fiscal and resource implications at the local level.

Voting: Traditionally, the Swedish political parties have been divided into three blocks: the conservative alliance (consisting of Moderaterna, Liberalerna, Kristdemokraterna, and Centerpartiet), the center-left alliance (consisting of Socialdemokraterna, Vansterpartiet, and Miljopartiet), and the Swedish Democrats (a nationalistic and socially conservative party). More often than not, parties within these blocs collaborate with each other both at the local as well as the national level to secure the necessary majority. We will use the same categorization in this paper.[16] In general, the conservative alliance (right wing) is a liberal-conservative bloc supporting a market-based economic system with fewer taxes and more privatization. The center-left alliance (left wing) emphasizes the need for a strong, active state financed through taxes as a key actor in a mixed economic system, where an active redistribution across individuals will ensure more equal and equitable outcomes.

3.4 Outcomes in Norway

Using Norwegian administrative data, we construct an analytical sample and a set of outcomes on the Norwegian side that resemble the analysis on the Swedish side as closely as possible. In this subsection, we therefore only describe the small differences in the definitions of the outcome variables we use.

At the individual level, we use each resident's place of birth to track trends in the share of workers that are foreign-born across municipalities to ensure that the localized labor market competition shock is coming through commuters rather than differential migration across municipalities in Norway. At the firm level, we lack disaggregated data on wages paid to commuters from Sweden. We also cannot identify exactly which firms employ these commuters. We can, however, observe employer-firm links for all workers who are residents on the Norwegian side regardless of their migration background. We use these links to construct a measure of total "domestic workers" connected to the firm. Importantly, we can also observe total personnel costs for the firm as reported to tax authorities, which includes wages paid to commuters from Sweden. Using this information, we can measure the possible displacement of domestic workers in favor of Swedish workers depending on the relative changes in these two variables. We also can use this measure to capture the labor share of revenues, which reflects a composite of labor costs dedicated to both domestic workers and commuters relative to their total output.[17]

[16] Liberalerna changed its name from Folkpartiet in 2015, and many of the traditional alliances changed after 2018. However, this is after our analysis period ends.

[17] We do not distinguish between full-time and part-time workers in these links, so a portion of any measured effects could be driven by, for example, a decrease in hours for domestic workers or eliminating a part-time position for a domestic worker.

4 Empirical Method

4.1 Estimation Strategy

Our analysis utilizes a conventional difference-in-differences framework, comparing changes in the outcomes of treated firms (and their municipalities) with changes in the outcomes of control firms (and municipalities) after 2004.

As illustrated in Figure 1, the Norwegian economy began diverging from the rest of the OECD in 2005 and eventually reached a new steady state in 2009. This suggests that the effects likely increased gradually from 2005 and were fully phased in by 2009. To capture this, we start by estimating non-parametric event study models to trace the treatment effects over time. While the models vary slightly depending on the unit of observation (firm or municipality), the general estimating equation is as follows:

$$Y_{it} = \alpha + \sum_{t=2001}^{t=2014} [\delta_t(Treat_{it})] + Z'\gamma + \varepsilon_{it}, \tag{1}$$

where Y_{it} represents an outcome of observational unit i —which may be a firm or a municipality —at time t. $Treat$ is a binary variable taking the value of one if the observational unit is located in a border municipality. The δ_t coefficients trace out any pre-treatment relative trends (for δ_{2001} through δ_{2004}) as well as any time-varying treatment effects (for δ_{2005} through δ_{2014}). We omit δ_{2004} such that all coefficients are relative to the year prior to the onset of the shock. Standard errors are clustered at the municipality level.[18]

In terms of the fixed effects in the Z vector, all specifications include year (γ_t) and municipality (ρ_m) fixed effects. The time fixed effects eliminate any macroeconomic shocks that affect all municipalities in the same year from biasing the results. The municipality fixed effects absorb any systematic differences across municipalities that are constant over time. In our firm-level regressions, we also include firm fixed effects to net out any time-invariant systematic differences across firms.

In an auxiliary analysis, we augment our main municipality-level model with two Bartik-style controls: (1) an industry control that interacts the industry-specific employment share in the municipality with national employment growth in that industry from 2004 until the current year, and (2) a demographic control that interacts the share of workers that are immigrants from the (EU25) 25-country expanded European Union (excluding the Nordic countries) with national growth in non-Nordic EU25 migrants after 2004. These controls account for predicted industry composition changes and regional in-migration due to the 2004 EU expansion, ensuring our core findings are

[18] Our results are robust to using the wild cluster bootstrap method, which rules out possible inference issues related to cluster imbalance (see Appendix Tables B1 and B2). The reporting structure for firm-level variables in Norway and Sweden is such that certain local establishments have workers spanning multiple municipalities. In the firm-level analyses, we, therefore, weight exposure in treatment/control areas by the share of a firm's total workers residing in the treatment/control municipalities and cluster the standard errors at the municipality-firm level for the firm analysis. However, over 90% of the observed firm units have the entirety of their employment within the same municipality.

not biased by these factors.

To parsimoniously summarize the large set of coefficients obtained through Equation 1, we also present results from a simplified difference-in-differences framework:

$$\begin{aligned} Y_{it} =& \alpha_i + \beta_1 Treat_m + \beta_2 PhaseIn_t + \beta_3 FullExposure_t \\ &+ \beta_4(Treat_m \times PhaseIn_t) + \beta_5(Treat_m \times FullExposure_t) + Z'\gamma + \varepsilon_{it}, \end{aligned} \tag{2}$$

where $PhaseIn_t$ is a dummy variable equal to one for observations in 2005 through 2009—the years during which we see a large divergence between the economic performance of Norway and the rest of the OECD. $FullExposure_t$ is a dummy variable equal to one for observations after 2009—the year after which the full divergence has taken place. The coefficients of interest in Equation 2 are thus β_4 and β_5, providing us with average effects of the commuting shock during the phase-in period (β_4) as well as during the full exposure period (β_5). All other variables are defined as above.

Causal identification from Equations 1 and 2 requires that outcomes in treated and control municipalities would have trended similarly absent the shock (the common trends assumption). This assumption is important because the estimation framework leverages the evolution of the outcomes in the control group to infer what would have happened in the treatment group without the shock. Additionally, identification requires no other contemporaneous policies or shocks coinciding with the Norwegian boom that occurred in the Swedish border municipalities relative to the Swedish control municipalities.

The results from Equation 1 help us examine if our data are consistent with the first assumption. Specifically, the δ_t coefficients trace out any pre-treatment relative trends (for δ_{2001} through δ_{2004}), allowing us to study to what extent trends in Swedish border municipalities prior to the boom matched those in the control municipalities.

In Appendix B, we subject our municipality analysis to a rich set of robustness checks to provide additional support for our required assumptions. We present sensitivity analyses where we randomly alter the set of non-border control municipalities 200 times, keeping the total number of control municipalities constant. We also show results when including all non-border municipalities as controls. Additionally, we examine how our estimates change by redefining and expanding the treated areas. We also perform a placebo treatment exercise in which we examine the distribution of coefficients when we randomly assign treatment status to the non-treated units. Finally, we present results using a synthetic difference-in-differences design. Taken together, these sensitivity analyses show that our findings are robust regardless of how the treatment and control units are defined; the results are robust to any type of constellation of control municipalities —whether we choose them ourselves or allow for algorithmic construction of the controls.

With respect to the second key identifying assumption—that no contemporaneous shocks dif-

ferentially affect treated and control municipalities at the time cross-border commuting increases—we focus on two potential concerns. First, the 2004 expansion of the European Union could have differentially affected border municipalities through migration, labor supply, or trade integration. Second, differential industry growth could generate heterogeneous local trends unrelated to cross-border commuting. We address both concerns by incorporating Bartik-style controls capturing municipality- and firm-level exposure to EU enlargement and industry-specific growth. Across specifications, the inclusion of these controls leaves the estimated effects qualitatively unchanged (see Appendix Tables A3–A5 and A4–A6). In addition, robustness exercises that randomize the set of control municipalities or expand the treatment region yield similar estimates, reinforcing the interpretation that differential contemporaneous shocks are unlikely to account for our findings.

Finally, our identification strategy on the Norwegian side requires that, absent the influx of Swedish commuters, the treatment and control areas would have experienced similar growth responses to the oil-price shock. It does not require that these growth responses be similar across all parts of Norway.

4.2 How Large Was the Swedish Labor Supply Response?

To leverage the Norwegian macroeconomic boom as a labor demand shock that increased labor market competition in Swedish border municipalities, it is essential to establish that the shock generated a sizable and localized commuting response. In this subsection, we document the magnitude, timing, and geographic concentration of cross-border commuting from Sweden to Norway.

Panel A of Figure 2 plots the annual number of Swedes earning labor income from Norway between 2001 and 2014. Prior to 2005, approximately 30,000 Swedes worked in Norway each year. Following the onset of the Norwegian boom, this number rose sharply between 2005 and 2009. Following 2009, as Norway's economy stabilized, Swedish commuting stabilized at a much higher level, with the number of Swedes working in Norway doubling over these four years.

Panel B compares trends in the share of workers commuting to Norway in treatment and control municipalities. Both groups exhibit relatively flat pre-trends. After 2005, commuting rises steadily in treatment areas, reaching approximately 12 percent of the local workforce by 2009, while no comparable increase is observed in control areas. (Appendix Table A7 shows that this increase is broad-based across industries with a weighted average increase of 3.2 percentage points.)

Panels C and D document the geographic concentration of the commuting response. Increases in Swedish commuting are highly localized to municipalities near the Norwegian border, with most commuters traveling to nearby Norwegian municipalities. This spatial concentration implies that the majority of Sweden was largely unaffected by the Norwegian boom, supporting the credibility of the control group.

Finally, a comparison on the Norwegian side reinforces the localized nature of the shock. By 2013, Swedish commuters accounted for roughly 2 percent of the workforce in control municipalities, compared to over 11 percent in treatment municipalities along the border.

Taken together, these patterns provide clear evidence of a large, persistent, and geographically concentrated increase in cross-border commuting from Sweden to Norway, implying a substantial rise in labor market competition faced by Swedish firms in border municipalities.

5 Results

We begin with Sweden because this is where the Norwegian boom translates into increased labor market competition: workers' outside options rise sharply, firms face immediate competitive pressure, and exposure to the shock varies cleanly across municipalities. We first present our core results on firm responses to increased labor market competition from Norway, documenting adjustments along intensive and extensive margins, including wages, employment, productivity, and firm survival. We then examine how these firm-level adjustments are reflected in community-level outcomes. Finally, we turn to Norway to study firm and community responses on the receiving side of the labor market shock.

5.1 Sweden

5.1.1 Firms

Table 1 presents our difference-in-differences estimates for Swedish firms across two adjustment margins: workers and earnings (Panel A) as well as value added and productivity (Panel B). To further explore the mechanisms behind these effects, we also provide evidence on capital intensification, revenues, and production scale-up (Appendix Table A8). Figure 4 shows event studies for the firm outcomes, with little evidence of pre-trends that could bias the results. The time patterns show small effects in the early years as commuting increased gradually, with stronger effects during the full exposure period when commuting peaked.

In terms of workers and earnings, Column (1) of Panel A shows that Swedish firms lost workers due to increased labor market competition from Norwegian firms. During the full exposure period, average firm size in Swedish border municipalities declined by 7 percent compared to the pre-shock mean. Column (2) indicates that many firms were unable to absorb the higher labor costs needed to retain workers in the face of competition from Norwegian firms, leading to a 17 percent increase in firm exits during the full exposure period compared to the pre-shock mean. Column (3) of Panel A shows that workers who remained in Swedish firms saw an earnings increase of about 2 percent in the full exposure period, although the difference-in-differences estimate is noisy. Event studies in Figure 4 provide more precise evidence of this earnings effect at the end of the sample period.

This average pay increase masks important compositional changes to the workforce. Commuters to Norway were positively selected even before the Norwegian economic boom: in 2004, workers who subsequently commuted to Norway earned approximately 20 percent more (in Sweden) than non-commuters (see Appendix Table A9 for additional, contemporaneous commuter characteristics). Estimating our base difference-in-difference model by subgroup, those above their

municipality's median income experienced a 6% earnings increase compared to 1% for those below the median. This suggests that the workers who remained at Swedish firms had lower pre-shock earnings and potentially lower productivity. Thus, productivity-adjusted earnings likely increased by more than shown in Column (3), reflecting firms' efforts to retain workers by raising wages in response to the competition from Norway.

To further test for positive selection, we estimate an AKM model with worker and firm fixed effects in the period before the commuting shock. At the individual level, we then regress their AKM worker effect on a dummy for whether they ever commuted to Norway after the shock as well as municipality fixed effects. This exercise shows that commuters' persistent earnings component from their AKM worker effect was 0.187 log points (s.e. = 0.0172) higher than their non-commuting counterparts in the same municipality. This result indicates a high level of positive selection into commuting independent of local firms' pay policies. By definition, the remaining workers at firms in the municipality are of lower average quality as captured by this worker fixed effect.

To clarify whether the observed wage increases reflect higher pay for continuing workers rather than compositional change, Appendix Table A10 restricts the analysis to incumbent workers—defined as workers continuously employed at the same firm before the shock. We find that wages for incumbent workers increase following the rise in labor market competition, while incumbent employment declines. The increase in earnings among incumbent workers shows that the aggregate wage effect is not mechanically generated by differences in earnings between workers leaving and remaining at Swedish firms. However, because continued employment at the firm is itself an endogenous outcome, these estimates may also reflect selection in which workers remain with their pre-shock employer.

If the average worker earns slightly more due to the Norwegian labor demand shock (or at least not less), but the quality of the remaining workers declines (as indicated by the positive selection of commuters discussed earlier), their earnings relative to their productivity would have increased substantially. This would lead to higher labor costs for firms relative to their overall production and productivity, helping to explain the sharp increase in firm exit rates shown in Panel A of Table 1. To examine this further, Panel B of Table 1 looks at value added and productivity effects. Column (1) shows a decrease in firms' overall value-added, while Column (2) confirms this reduction on a per capita basis, with a significant 12 percent drop. These patterns suggest that Swedish firms are paying slightly higher earnings despite losing workers who were positively selected on pre-shock earnings. Thus, their earnings relative to value-added output have risen due to the increased competition for labor from Norway. To examine the relationship between worker earnings and firm production more directly, Column (3) examines the value-added–earnings gap: the difference between value added per worker and average worker earnings. This gap shrinks sharply after the labor demand shock, reflecting both the decline in value added per worker and the

marginal increase in average earnings. Thus, worker earnings absorb a larger share of value added per worker following the increase in competition. Together with the reductions in employment and increased firm exit documented above, these results show that exposed firms face higher labor costs relative to output and adjust along multiple margins. This pattern is consistent with models in which upward pressure on wages leads to the reallocation of labor, decreases in employment, and firm exit.

Finally, in Appendix Table A8, we also examine how firms respond through capital use, net revenues, and production scaling. While there is no significant effect on capital use (a noisy 10 percent decrease relative to the pre-shock mean), we observe an 18 percent drop in the total value of firm inventories, which measures the value of final goods held for future sales. This indicates a considerable long-term scale-down effect. In terms of net revenues, we find a significant 12 percent decline.

Taken together, the Swedish firm results show that increased labor market competition leads to substantial re-optimization along multiple margins. Exposed firms raise wages for remaining workers, reduce employment, experience declines in value added and productivity, and exit at higher rates. Overall, the evidence indicates that intensified labor market competition reshapes firm behavior with potentially important implications for local communities.

5.2 Local Communities

We next examine how increased labor market competition is reflected in outcomes at the community level. Our core findings from the Swedish border communities analysis using Equation 2 are shown in Table 2. We present results from three different margins of adjustments: labor market outcomes (employment in Norway, employment in Sweden, overall employment, unemployment benefits, and earnings), inequality (earnings effects at the 10th, 50th, and 90th percentile of the income distribution), and municipality population and business activity (number of workers, and number of firms). These outcomes characterize how local economies evolve as firm behavior adjusts to heightened competition, without imposing a specific mechanism linking firms and communities. The corresponding event studies are shown in Figure 5 for key outcomes, with additional outcomes in Appendix Figure A3. The figures generally show little evidence of differential pre-treatment trends between treatment and control areas.

To understand the aggregate labor market implications of the firm-level adjustments documented above for local communities, we now examine employment, unemployment benefit take-up, and earnings at the municipality level. Panel A of Table 2 shows that increased labor market competition leads to large reallocations of employment across borders. Column (1) documents a significant 415 percent increase in Norwegian employment for Swedish residents relative to the pre-shock mean. Figure 5 shows that this effect grows steadily over time and stabilizes in 2009, when Norway's disproportionate rate of economic growth ended. By the end of the analysis period, approximately 11 percent of the population in Swedish border municipalities worked in Norway.

Column (2) shows that the decline in employment in Sweden is smaller than the increase in Norwegian employment, while Column (3) indicates a slight, though statistically non-significant, increase in overall employment rates for residents. Column (4) shows a small reduction in unemployment benefit take-up. Taken together, these results indicate that heightened labor market competition faced by Swedish firms primarily reallocates employment from local jobs toward jobs in nearby Norwegian municipalities, with only limited net effects on overall employment.

Column (5) shows that these employment shifts are accompanied by a statistically significant 6 percent increase in earnings for Swedish residents relative to the pre-shock mean.[19] To facilitate interpretation, note that 1 USD $\approx$ 10 SEK/NOK during the sample period. As with the employment effects, Figure 5 shows that earnings increase gradually and stabilize after 2009. Taken together, Panel A shows that intensified labor market competition among firms—driven by the Norwegian labor demand shock—raises workers' outside options and generates sizable earnings gains in Swedish border communities.

Given the nature of the shock and the heterogeneous increase in workers' outside options generated by firm-level competition, it is likely that the average earnings effect in Panel A masks substantial heterogeneity across the income distribution.[20] To examine this in detail, Panel B shows the earnings effect on the 10th, 50th, and 90th percentile of the income distribution. We observe a substantial increase in earnings at the 90th percentile (7 percent relative to the pre-shock mean), a smaller effect at the 50th percentile (4 percent relative to the pre-shock mean), and no effect at the 10th percentile. The event studies in Figure 5 show that these effects develop over time, with the full exposure effect being nearly 100 percent larger than the phase-in effect.[21]

After having examined the aggregate labor market and inequality effects of the Norwegian labor demand shock on Swedish border municipalities caused by the increased competition over labor among firms, we turn to analyze the effect on the number of people, the number of workers, and the number of firms in these border communities.[22]

Column (1) of Panel C documents a sharp decline in the population of Swedish border municipalities, with Figure 5 showing a gradual development over time. By the end of the sample period, these municipalities had lost about 5 percent of their populations. As shown in column (2) of Panel C (and in Figure 5) most of the population decline is driven by a fall in the number of workers in these areas. That the effect on the overall population is larger than the effect on the number of

[19] Using log earnings yields identical percent effects, with a coefficient on the full exposure variable of 0.06 and a standard error of 0.012.

[20] Appendix Table A9 shows that Swedish commuters during the sample period were more likely to be male, hold a college degree, and have higher annual earnings while being less likely to be married or have children.

[21] In Appendix Table A11, we analyze the impact of these differential effects across the income distribution using conventional inequality measures: the 90-10, 90-50, and 50-10 gaps. The results confirm that the labor demand shock significantly increased income inequality among Swedish residents, driven mainly by accelerated income growth for those at the top of the pre-shock income distribution.

[22] We present these findings with variables measured in levels; we show robustness to using Poisson specifications in Appendix Table B3.

workers is consistent with some workers relocating together with their families.

The population decline in Swedish municipalities is not driven by an outflow of Swedish workers to Norway, mostly because the incentives to move to Norway from a border municipality in Sweden are limited. The commuting distance is short, it is considerably more expensive to live in Norway, and workers have established social networks in Sweden. Rather, as we show in Appendix Figure A4, the individuals who leave the Swedish border municipalities move to other Swedish municipalities with no particular mass in specific Swedish municipalities.[23] Furthermore, the types of municipalities they move to remain constant before and after the shock (Appendix Figure A5). In other words, the number of out-movers increases substantially, but there is no systematic change in their destinations after the shock.

The population decline in Swedish border municipalities occurred despite the strong increase in commuting opportunities generated by the Norwegian boom. Rather than attracting net in-migration, these areas experience sustained population losses, indicating that the expansion in outside job opportunities did not translate into local population growth.

Two features of the adjustment documented above help contextualize this pattern. First, the heterogeneous earnings effects across the income distribution shown in Panel B of Table 2 indicate that the gains from increased labor market competition are concentrated among higher-income workers. Lower-income residents did not experience comparable earnings growth and face rising local inequality, which may reduce the relative attractiveness of remaining in these communities.

Second, the firm-level results show that increased competition for labor leads to contraction and exit among Swedish firms, particularly in settings where rising labor costs cannot be absorbed. As firms reduce employment or exit, local job opportunities and business activity decline, contributing to population outflows. Taken together, the population effects are consistent with the combined influence of unequal labor market gains and reduced local firm activity following heightened labor market competition.

In columns (3) through (6) of Panel C, we document a reduction in the number of establishments operating in Swedish border municipalities.[24] The event study in Panel F of Figure 5 confirms this effect for firms with more than three workers, with a time pattern consistent with the other outcomes discussed earlier. Firms across the entire size distribution are affected, with slightly larger firms experiencing the largest proportional declines relative to baseline.

These patterns mirror the firm-level responses documented in Section 5.1.1, where increased wage pressure and declining productivity coincide with elevated exit rates. As firms exit or contract, local business activity declines, contributing to the reduction in the number of operating

[23] In Appendix Figure A4, we also show that (1) people in the treated areas do not disproportionately move to our control areas and (2) there is no reallocation from the buffer zones to the treatment areas on the Swedish side.

[24] In auxiliary analyses, we find that these effects are primarily driven by firm exits, with no notable change in the entry margin.

establishments observed at the municipality level.[25]

When interpreting the community effects in this section, it is important to consider that part of these effects may result from compositional changes in the population of Swedish border municipalities. Increased competition from Norwegian firms, and the resulting firm-level adjustments, have led to both labor market reallocations and population outflows to other parts of Sweden. Studying how this alters the composition of the local population is therefore important both for interpreting the observed effects and as outcomes of independent interest. Table 3 presents results from our main difference-in-differences analysis, examining changes in population characteristics such as education, gender, age, marital status, and number of children. Interestingly, we find little evidence of substantial compositional change, with the only notable shift being a disproportionate decline in the share of married individuals. Overall, population outflows from the border regions appear to be broadly balanced across education levels and other characteristics.

Finally, the adverse community effects may have an impact on the political sentiments of the local populations. Traditionally, the Swedish political parties have been divided into three blocks: the conservative alliance (consisting of Moderaterna, Liberalerna, Kristdemokraterna, and Centerpartiet), the center-left alliance (consisting of Socialdemokraterna, Vansterpartiet, and Miljopartiet), and the Swedish Democrats (a nationalistic and socially conservative party). More often than not, parties within these blocs collaborate with each other both at the local as well as the national level in order to secure the necessary majority. We use the same categorization in this paper.[26]

Figure 6 plots the share of votes received by each of these three political units in local municipalities, following the same estimation strategy as that underlying Equation 2. The results provide evidence of a clear shift from the socially conservative party towards the center-left alliance. This effect is not only statistically significant at conventional levels, but also economically meaningful. The results suggest that increased competition–and the effects brought about by competition documented here–pushes the community towards traditional worker parties that emphasize redistribution and a strong, active state financed through taxes as a key actor in a mixed economic system.

Taken together, the community-level results for Swedish border municipalities show that increased labor market competition is associated with substantial reallocation across space and distributional outcomes within communities. While overall employment rates change little, commut-

[25]The increased labor competition likely affects public budgets in Swedish border municipalities as well. In Panel A of Appendix Table A11, we show a significant decline in total wage income due to fewer workers, impacting local tax revenues and social support equalization from the central government. While there are reductions in both sources of revenue, the effect on tax revenues is particularly strong. The overall effect of this is a large decline in total funding to the Swedish border communities that will likely have implications for new investments and developments. On a per capita basis (Appendix Table A11, Panel B, Columns 4 and 5) the decline in tax revenue is not large or significant, and most of the decline is offset by a marginal but not statistically significant increase in social support spending per capita. The Scandinavian social support equalization scheme likely mitigates some of the competition's impact on communities, and in regions and countries without such schemes, the effects could be even greater.

[26]There are also smaller parties that have no presence in the national political arena and that make up a small fraction of the total vote share. We drop these parties from the analysis.

ing increases sharply, earnings gains are concentrated at the top of the income distribution, and local inequality rises. These labor market adjustments coincide with declines in population and the number of operating firms, reflecting the contraction and exit documented at the firm level. Overall, the Swedish community results characterize how local economies adjust when firm behavior responds to heightened competition for labor.

5.3 Norway

5.3.1 Firms

Our core findings from the firm-level analysis on the Norwegian side of the border are summarized in Table 4. Similar to the Swedish analysis, we present the difference-in-differences estimates for Norwegian firm outcomes and focus on workers and earnings (Panel A) and value added and productivity (Panel B). Event studies for these firm outcomes are shown in Figure 7.

In terms of workers and earnings, Column (1) of Panel A shows that Norwegian firms significantly reduce the number of non-commuter employees by around 10 percent relative to the pre-shock mean. While we cannot directly link Swedish workers to specific Norwegian firms, the community-level analysis shows that the employment rate for domestic Norwegians falls by a relatively small amount and is offset by commuting to neighboring municipalities. Swedish workers commuting to Norway increased by over 400 percent, and the average firm size on the Swedish side declined by 7 percent. Therefore, the reduction in domestic employment seen in Column (1) likely reflects the substitution of Norwegian workers with Swedish commuters. Column (2) of Panel A shows no significant effect on firm exits, consistent with the null effect on the number of operating firms in Norwegian border municipalities found in the community-level analysis. Finally, Column (3) reveals a significant drop in the average pay for domestic resident workers in Norwegian border firms, with earnings decreasing by approximately 3 percent relative to the pre-shock mean by the end of the analysis period, likely due to the influx of Swedish commuters.[27]

In Panel C of Table 4, we explore the impact of the increased inflow of Swedish commuters on value added and productivity. While there is no significant change in the total value added at Norwegian firms (Column 1), Column (2) shows that value added per domestic worker rises by 43,000 NOK, which is an 8.5 percent increase from the pre-shock mean. Because commuters do not count toward the denominator but contribute to the numerator, part of this may be mechanical. However, Column (3) shows that the gap between value added per domestic worker and the average

[27] To better understand the turnover and earnings changes experienced by Norwegian firms due to the influx of Swedish commuters, Appendix Table A12 examines the effects on incumbents employment and earnings. Column (1) shows that the reduction in domestic employment is driven by an increased exit rate of incumbent workers. This aligns with the spatial reallocation of workers to buffer zones, as shown in Table 6 and discussed in Section 3.2. However, incumbents experience earnings reductions. This suggests that Norwegian firms lower domestic wages in response to the shift in labor supply. This is expected, as the inflow of Swedish commuters intensifies job competition and exerts additional downward pressure on wages, likely due to Swedish commuters having a lower reservation wage. This is similar to the case of immigrants in general (Hirsch and Jahn, 2015), and theories and evidence that commuters may not be fully compensated for their commutes (Manning, 2003b). This is also consistent with the typical predictions of a labor supply shock when demand for goods and services is held fixed, which is expected given that we examine a commuting shock rather than a migration shock.

annual earnings of domestic workers grew by nearly 30 percent. Consistently, Column (4) shows that personnel costs—which include the cost of wages to Swedish commuters—as a share of total operating revenues drop by about half a percentage point, indicating a decrease in personnel costs relative to revenues generated. Norwegian border firms maintain similar value-added levels while reducing personnel costs due to the influx of cheaper Swedish commuters.

Overall, these results are consistent with substitution of domestic workers toward Swedish commuters, leading to a reduced overall wage bill without a decline in value added. Norwegian firms benefit from the labor supply shift by maintaining the same level of production while paying significantly less for the output, capitalizing on the lower labor costs brought by Swedish workers.

5.4 Local Communities in Norway

Our core findings from the community analysis on the Norwegian side of the border follow the same structure as that on the Swedish side of the border, and the main difference-in-differences estimates are shown in Table 5.

In terms of aggregate labor market outcomes, Panel A of Table 5 shows no effect on the total employment rate in the Norwegian border municipalities when we include resident and commuter labor. The event study in Figure 8, with additional outcomes in Appendix Figure A6, confirms that there are no time-varying effects missed by the difference-in-differences design and that there are no pre-treatment trends that may bias our findings. However, columns (2) and (3) reveal important worker reallocations. Column (2) shows a significant 2.1 percentage point reduction in domestic resident employment rates relative to the pre-shock mean, while column (3) indicates a 160% increase in Swedish commuters as a share of domestic workers. This suggests that the supply shock of Swedish workers led to a shift away from domestic employees towards Swedish workers. The event studies in Figure 8 show these effects grew over time and stabilized in 2009, similar to the pattern observed in Sweden.

The results in Panel A of Table 5 confirm a large inflow of Swedish commuters to Norwegian border municipalities in response to the shock. To further explore spatial displacements and spillovers, Table 6 presents two additional findings. In Panel A, we show reduced inflows to the border municipalities. In Panel B, we find that domestic Norwegian workers are more likely to work in buffer zone areas—municipalities adjacent to the treated border areas (but not included in the control group). These results suggest a spatial displacement pattern among domestic workers, with fewer moving to border municipalities and an increased likelihood of commuting from border municipalities to other municipalities. Overall, while there is no significant effect on total employment, there is clear evidence of worker reallocations caused by the inflow of Swedish commuters. Inflows of domestic labor were redirected away from border municipalities to buffer areas, border residents' average earnings declined marginally, and (particularly) top earners were spatially displaced. This pattern aligns with standard predictions for a labor supply shock in a setting where demand for goods and services is held fixed, as is the case given the institutional context of the

commuting shock.

Similar to the analysis on the Swedish side, the average effects in Panel A of Table 5 may mask effect heterogeneity across the income distribution. As discussed above, Swedish commuters tend to be positively selected from the top of the income distribution. This may lead to greater displacement effects among higher-income Norwegian workers due to the disproportionate increase in competition in that part of the income distribution.

In Panel B of Table 5, we explore the impact of the shock on the earnings of Norwegian domestic workers at the 10th, 50th, and 90th percentiles of the pre-shock income distribution. There is little effect on earnings at the 10th percentile, while workers at the 50th percentile experience small, suggestive negative earnings effects (a 0.8 percent reduction relative to the pre-shock mean, significant only during the phase-in period). In contrast, workers at the 90th percentile see large and significant earnings reductions of 2.6 percent.[28]

After having examined the effect on labor market outcomes and inequality, we turn to analyze the effect of the shock on the population, workforce, and number of firms in the Norwegian border communities.[29] The results in Panel C of Table 5 show no impact on the population size, number of workers, or number of operating firms of various sizes in the Norwegian municipalities. Although there are no detectable effects on the number of firms, this shift may still affect firms' production and operations by providing access to a cheaper, high-quality labor source, a key input in the production process. This pattern is consistent with the firm-level evidence documented above.

6 Robustness and Sensitivity Analyses

The paper has established the main results using firm-level analyses. To ensure that these findings are not driven by pre-trends or by concurrent secular shocks or policies, we have examined firm-level event studies, incorporated Bartik-style controls, and conducted placebo tests based on random reassignment of analysis units. In this section, we extend these exercises to a broader set of community-level robustness and sensitivity analyses, which both replicate these checks at the municipality level and introduce additional tests that are inherently defined at the community level.

6.1 Selecting the Control Group

Changing the Control Group. A challenge with our estimation approach is selecting the control group. The control municipalities we use in our core specification are located in counties (the largest geographic subdivision of Sweden) that border the counties where the treatment municipalities are situated but are separated by a buffer of untreated municipalities in the treatment counties (Figure 3). This setup ensures a spatial buffer between the treated and control municipalities. We chose these control municipalities because they are geographically close to the treatment municipalities but are sufficiently distant from the border to remain unaffected by the labor demand shock

[28] In Appendix Table A13, we show results for the 90-10 gap, the 90-50 gap, and the 50-10 gap. These results confirm that this shock reduced income inequality in Norway, driven by a reduction in earnings for workers at the top of the income distribution.

[29] We show robustness to using Poisson specifications in Appendix Table B4.

on the Norwegian side of the border. For example, to drive from any of these control municipalities to the Norwegian border would take more than 4 hours.

Since the control group is non-randomly selected, we conduct a permutation exercise. In this exercise, we randomly assign 60 Swedish (79 Norwegian) municipalities, excluding border areas, to the control group.[30] We repeat this 200 times (with replacement) and re-estimate our main results for each alternative control group, plotting the distribution of coefficients. The results are shown in Appendix Figure B1 for Sweden and Appendix Figure B2 for Norway across six key outcomes. The figures plot the coefficients from the "full exposure" values from Equation 2 and add vertical lines representing our baseline estimates.

For Sweden, Appendix Figure B1 demonstrates that our core findings hold when using alternative control groups, as all 200 coefficients are statistically significant. However, the point estimates vary slightly. While our core results for employment in Norway (Panel A), total employment (Panel B), and total wage (Panel C) are close to the median of the coefficient distribution from the 200 alternative specifications, the estimate for the 90th percentile (Panel D) is on the higher end, and our baseline estimates for population (Panel E) and number of firms (Panel F) appear slightly conservative compared to these permutations.

For Norway, the alternative control group permutation exercise suggests that our core results may be somewhat conservative for the 90th percentile (P90), earnings, number of firms, and population. This is expected, as the positive macroeconomic shock we analyze originated on the Norwegian side of the border and may have been unevenly distributed, with larger impacts in areas of significant natural resource growth but stagnant population (mainly in the northern and western regions). This is why our core analysis focuses on control municipalities in the eastern and southern parts, where the shock's impact is more comparable to the treatment region. Expanding the control group to areas that experienced stronger shocks leads to increased treatment effects, as anticipated.

Expanding the Control Group. In addition to randomly reassigning municipalities to the control group, we re-estimate our main specification using all non-border municipalities as controls, with and without the largest metropolitan areas (Stockholm, Gothenburg, Malmö in Sweden; Oslo, Bergen, Trondheim in Norway). This approach creates a control group more distinct from the treatment group relative to our preferred specification but helps determine whether border municipalities followed a different outcome trajectory than the rest of the country after the Norwegian labor demand shock. It also rules out the idea that our control municipalities are experiencing any unique but unmeasured positive shocks of any kind relative to the rest of the country. The results are presented in Appendix Table B5 for Sweden and in Appendix Table B6 for Norway.

For Sweden, adjusting the control group to include all municipalities except the three largest

[30] We chose 60 municipalities in Sweden (79 in Norway) to match our baseline estimates where we have 60 (79) municipalities in the control group.

metropolitan areas (Panel A) does not impact our main estimates. However, when the metropolitan areas are included (Panel B), the effects on population and number of firms increase slightly, likely due to differing population growth trends in these areas. For Norway, including municipalities from the western and northern regions amplifies the treatment effects, similar to our findings in the control group permutation test, as these areas may have disproportionately benefited from the macroeconomic growth shock during this period.

6.2 Alternative Identification

Synthetic Difference-in-Differences. The goal of the permutation exercise is to ensure that our results are not driven by the specific choice of control units. Another way to explore this is by applying a synthetic difference-in-differences approach (Arkhangelsky et al., 2021), which extends the logic of the synthetic control method (Abadie et al., 2010) to a difference-in-differences setting. In a two-way fixed effects model with unit and time fixed effects, this method creates a synthetic weighted average of the pre-treatment outcomes from control units to match the trends of treated units in the pre-treatment period and then examines changes in these weighted averages after treatment.

Instead of directly matching covariates in the treatment and control areas before treatment, the synthetic difference-in-differences method matches pre-treatment outcome *trends* after accounting for covariates in the pre-treatment period. Our covariates include demographic factors (age, gender, education) and the share of workers in key industrial sectors–manual sectors like manufacturing and construction, services, and public–during 2001-2004. We include all non-border municipalities in Sweden that are not in counties bordering Norway as part of the donor pool, excluding the largest metropolitan areas (Stockholm, Gothenburg, Malmö). The same is done for Norway, excluding Oslo, Bergen, Trondheim, and three municipalities representing the largest employment centers for the oil sector (Stavanger, Hammerfest, Kristiansand). The results are consistent even when adjusting the covariate mix or donor pool restrictions.[31] In the model, we exclude the "phase in" period and report the "full exposure" coefficients to align with our main approach.

For Sweden, the synthetic difference-in-differences approach produces estimates similar to our core findings, though the negative effects on population and firms are slightly larger, consistent with our permutation exercise, which suggested our core estimates may be somewhat conservative (Appendix Table B7). For Norway, the synthetic difference-in-differences results closely match our baseline for most of the outcomes. As in Sweden, the baseline model may be on the conservative side (Appendix Table B8).

Dosage Design. On the Swedish side, we can use individual commuting data to estimate which municipalities in the treatment group were later more exposed to the shock due to pre-shock differences in the baseline propensity to commute among their residents. This allows us to estimate a dose-response difference-in-differences model, utilizing variation in treatment exposure

[31] We use Arkhangelsky et al. (2021)'s bootstrap procedure for inference.

rather than assuming all treatment municipalities were equally affected based on demographics and industry composition.

To perform this exercise, we first restrict our sample to individuals who are located in our main treatment municipalities in the year prior to the shock (2004). We then estimate a linear probability model of commuting using the following pre-shock variables as predictors: age (bins), gender, marital status, presence of children under the age of 18, industry of work, education, total wage, and cross-border commuting status. Next, we use these estimates to calculate the average predicted post-shock commuting probability within each of our treatment municipalities. Finally, we estimate a modified version of our main specification in which we interact the phase-in and full-exposure dummies with this predicted dosage variable rather than with a dummy that treats all municipalities in the treatment group as identical.

The results in Appendix Table A14 exhibit strikingly similar patterns to the main findings. This is reassuring, suggesting that those areas in the treatment group that likely experience a greater outflow of workers in response to the shock also experience the largest effects due to the shock. To interpret these briefly, in Panel A, a 10 percentage point increase in the predicted share of workers within a border municipality commuting to Norway raises average earnings by 12,300 SEK. In Panel C, the population of the municipality declined by approximately 570 people and 360 workers. The number of firms decreased by approximately 25. These effects are remarkably similar in scale to the effects in Table 2.

6.3 Alternative Explanations and Falsification

Industry Compositions. A possible threat to our interpretation of the estimates being driven by increased demand for - and competition over - labor, is potential changes in industry composition directly affecting firms and (indirectly) communities. We approach this concern with two pieces of evidence and show that this is unlikely to drive our findings. First, we show that industry compositions between the treatment and control groups both on the Swedish and Norwegian side are remarkably similar at baseline. These results are shown in Appendix Table A15 and A16. Second, we construct a Bartik-style shift-share industry control that interacts the industry-specific share of total employment in the municipality with the national growth in employment in that industry from the year before the shock (2004). This control is intended to capture any ex-ante predicted shocks to industry composition over time and ensure that our core findings are not biased by such phenomena. The results are presented in Appendix Table B9 for Sweden and Appendix Table B10 for Norway. The tables show that our findings are qualitatively robust to controlling for possible changes in industry compositions over time, suggesting that this is not biasing our findings. Given the nature of the shock (a highly localized labor market shock) and the fact that the industry composition is very similar at baseline, this result is expected.

European Union Expansion. Another potential threat to our identification is the 2004 EU expansion, which admitted 10 new member states and allowed free movement across the region,

leading to a large inflow of workers from Eastern Europe. If differential immigration from these new member states occurred between our treatment and control groups, it could bias our results. We address this concern with two analyses. First, we show that the number of non-Nordic EU25 workers entering our treatment and control areas remained similar throughout the analysis period in Sweden (Panel A of Appendix Figure A7).[32] While other parts of Sweden saw a sharp rise in EU25 workers, the increase in our sample areas was smaller and consistent across treatment and control groups. This is because most new migrants settled in large metropolitan areas, which are excluded from our analysis. The same is true in Norway (Panel B), where the migration effects of EU expansion were mostly felt in areas outside our treatment and control areas. Treated municipalities had a slightly smaller influx of workers after EU expansion despite parallel trends and similar levels before 2005. This is likely a direct result of the differential influx of Swedish commuters, consistent with the spatial diversion of worker inflows away from border municipalities (see Table 6).[33] Second, we construct a Bartik-style control, qualitatively interacting the non-Nordic EU25 share of employment in 2004 with national EU25 migrant growth post-2004. Results in Appendix Table B11 for Sweden and Appendix Table B12 for Norway closely match our baseline findings, suggesting that the EU expansion is not a significant concern.[34]

Placebo Estimates. In addition to examining robustness to the choice of control municipalities, exploring alternative identification approaches, and studying potential confounders, we also conduct a series of placebo tests. To do so, we generate 50 quasi-random clusters of fake treatment municipalities (random selection with replacement) from the pool of municipalities that are not in our main treatment group and not in our main control group. Similar to before, we also exclude the three metropolitan areas of Stockholm, Gothenburg, and Malmö. Using these 50 placebo treatment groups, we then re-estimate our main specification and plot the distribution of the estimates.

The results from this exercise are presented in Appendix Figure B3 with respect to Sweden, and show that our baseline estimates are always at the tails of the distribution. This exercise helps rule out the possibility that our core results are driven by features common to arbitrary sets of non-border municipalities.[35] A similar exercise with the same conclusion for Norway is shown in Appendix Figure B4.

[32] We use this designation of EU25 countries because we cannot isolate the exact country of origin for immigrants in the data on the Swedish side.

[33] Estimating our difference-in-differences model on the share of non-Swedish resident immigrants yields a significant point estimate of -0.014, indicating possible displacement of non-Swedish immigrant inflows.

[34] In Norway, we can isolate immigration from the 10 EU expansion states rather than relying on coarser measures of the 25 EU states. As on the Swedish side, these Bartik controls do not impact our results, with the exception of the exit margin, which becomes statistically significant. However, we are careful not to over-interpret this result because it is not robust across specifications. Thus, the gap between treatment and control groups in non-Swedish immigrant inflows in Norway likely results from the influx of Swedish commuters, not external factors. Our results are also robust to directly controlling for demographic and skill composition (Appendix Table B13).

[35] This exercise also provides strong non-parametric evidence of statistical significance regardless of the asymptotics of the clustering structure or spatial correlation of the errors, as might be a concern with spatial units that are located next to each other.

6.4 Demand for Goods and Services

During the period of rapid growth in Norway, one might expect that higher-income Norwegians might increase their purchases of Swedish goods and services due to cross-border differences in the relative costs of goods, boosting demand and profits for local businesses in Swedish border areas. This could mute any potential negative effect of increased labor market competition on local firms and cause our estimates to constitute lower bounds. However, there is no evidence of differential changes in cross-border trade between border and non-border municipalities on either the Swedish (buyer destination) or Norwegian (buyer source) side (Appendix Figure A8). While there is some increase in trade in Strömstad compared to other border trade destinations, this occurs post 2009—after the Norwegian economy and the Swedish commuting rates had already stabilized—making it inconsistent with the timing of our observed effects. This provides strong support for our effects identifying local labor shocks rather than spillovers from product demand.

It is important to note that while the Norwegian macroeconomic shock affects the labor market rather than the goods market, there could still be general equilibrium effects on the goods market in Sweden. If Swedish workers earn more as a result of commuting, they are likely to increase spending, which could increase demand for local goods and services, potentially muting any observed negative impacts on firms and local community development. Conversely, if the shock causes population flight, local demand could decline, amplifying any negative impacts on firms and communities. This is not a concern for identification but rather a potential mechanism underlying our results. In Section 7, we explore this in detail, including a firm-level analysis for companies in the tradable goods sector, which are less influenced by local demand changes (see Beaudry et al. (2012)).

6.5 Spillovers

In the main analysis, we focused on the populous border municipalities in southern Sweden as the treatment group to capture the areas most affected by the shock. However, it is important to explore whether the sparser northern border municipalities were also impacted and whether there are spillover effects to nearby municipalities that do not border Norway.

To this end, we have estimated a series of regressions in which we first expand the treatment group to include all border municipalities (including those in the sparse northern area), all municipalities in the counties that our main treatment municipalities are located in (including those municipalities in the counties that are not on the border), all municipalities in all border counties (including those in the north), all municipalities in the counties that our main treatment municipalities are located in except our main treatment municipalities, and all municipalities in all border counties except those that are at the border. The idea behind this analysis is to examine how pervasive the effects are as we gradually move away from the most affected areas, both in terms of assessing the likely validity of our estimation strategy (the further away from the border, the smaller we expect the effects will be) and in examining potential spillover effects. The results are

shown in Appendix Figure B5 for Sweden and in Appendix Figure B6 for Norway.

In Sweden, the results illustrate the gradual expansion of the treatment group to encompass all border municipalities leads to a slightly muted commuting effect but otherwise very similar estimates as our baseline estimates. The results further show that there are some small commuting and wage effects on municipalities that are not on the border. However, these effects are significantly smaller than our baseline results and do not translate into significant effects on population and number of firms. This demonstrates how localized the labor competition shock was, helps strengthen the SUTVA assumption underlying our core estimation approach, and suggests that our selected set of control and treatment municipalities is appropriate. This result is also interesting from a policy perspective, highlighting the very local nature of labor market shocks and the implications for community development.

In Norway, the treatment effects when we include all border municipalities in the analysis are generally marginally smaller than when we use our base treatment municipalities. When including the entirety of border counties in the analysis or for other configurations, the estimates are typically not statistically different from zero. Notably, when using municipalities in border counties that are not actually touching the border as treatment units, there is some evidence of possible spatial spillovers for some outcomes, consistent with Table 6: the sign of the effects from our main treatment group often flip (spillover 1 and spillover 3). This result underscores that our exclusion of non-border municipalities in border counties in our treatment and control groups (giving us a spatial buffer between the two) is appropriate.

7 The Goods Market

As shown in Appendix Figure A8, the Norwegian shock primarily affects labor markets rather than goods markets. Nevertheless, local goods markets could respond indirectly in general equilibrium. Higher earnings among Swedish commuters may increase local demand, potentially offsetting firm contraction and population decline, while population outflows could reduce demand for locally produced goods and services. Although such general equilibrium effects do not threaten our identification strategy—since our estimates capture the total impact of increased labor market competition on local communities—it is important to assess whether goods-market adjustments account for the firm and community outcomes we document. We therefore conduct a set of supplemental analyses to evaluate the role of local and tradable goods markets.

First, we examine the impact of increased labor market competition on sales revenue in the retail, hotel, and restaurant industries (which we call "local goods") across control and treated areas to assess how local demand for goods and services has shifted in response to the shock. This is important because our analysis shows two opposing forces affecting local demand: rising earnings and declining population. Second, we analyze house prices in treatment and control areas to gain further insight into how the labor demand shock in Norway affected local prices in Sweden. This is relevant because wealthier individuals can afford higher property prices, while population decline

could drive prices down. Lastly, following insights from Beaudry et al. (2012) and Caldwell and Danieli (2024), we re-estimate firm effects focusing on firms producing tradable goods more likely to be sold outside the region. This provides a complementary test of the competition channel by focusing on firms less affected by changes in local product demand.

The results from our supplemental analyses on house prices and local goods sales revenue are shown in Appendix Table A17, and the effects on firms in the tradable goods sector are shown in Appendix Table A18. We find no effect on the aggregate sales revenue of firms producing locally consumed goods and services, indicating that increased income from commuting and population decline offset each other. We also find no effects on house prices, suggesting that the rise in disposable income is counterbalanced by population decline and growing inequality. Finally, the impact of increased competitive pressure on Swedish firms in the tradable goods sector is similar to the overall effect in all sectors. Overall, these analyses strongly suggest that the goods market is not the main channel through which our observed effects operate, offering new insights into the relationship between labor market competition and local community development.

8 Discussion

This paper provides novel evidence on the consequences of labor market competition on the entire ecosystem of local communities, examining the impact across all segments of society using unique features of the Scandinavian labor market as a testing ground. Identifying variation is obtained from a shock to labor mobility from Sweden to Norway, which generated a substantial increase in labor competition for Swedish firms on the border.

The main takeaway from this paper is that changes to the outside options of workers can have large, persistent effects on local communities. These effects cascade across all segments of society, even in countries where automatic stabilizers are designed to cushion the impact of local economic shocks. Specifically, we show that Swedish firms respond to competition by raising worker wages relative to value added per worker and reducing their workforces. Workers commuting to Norway are positively selected on pre-shock earnings, meaning that exposed firms disproportionately lose some of their most valuable workers. Exposed firms also experience a decline in value added per worker and an increasing probability of market exit. The negative effects on firms spill over to the communities, which experience population reductions, declining business activity, increased inequality, and increased support for traditional worker protection parties. These effects remain visible through 2014, roughly a decade after the onset of the shock.

We use similar data from the Norwegian side to provide evidence that some Norwegian workers are being displaced following the influx of Swedish workers. In particular, positively selected Swedish workers increase competition toward the top of the Norwegian earnings distribution. Consistent with this increase in competition at the top of the skill distribution, earnings decline disproportionately among high-earning Norwegian workers, compressing the local earnings distribution. We also show that Norwegian firms benefit through lower labor costs and higher value added rel-

ative to labor costs, consistent with firms being better off than in a world in which they could not take advantage of Swedish labor.

In interpreting our findings and applying them to other contexts, it is important to note that our commuting shock came not through a policy change, but arose organically from a shock to labor demand, an increase in wage differentials across the Norwegian border, and a responding labor supply shock from Sweden. We thus significantly advance the existing literature by (1) analyzing both sides of the affected border; (2) examining multiple adjustment windows such as worker flows and community- and firm-level effects; (3) isolating a labor supply shock via commuting, which limits the product-demand effects that typically accompany immigration; and (4) analyzing a shock that occurs frequently, i.e. changes in financial incentives for commuting. Most importantly, our paper extends beyond the literature on border effects and is applicable to any emergence of labor demand shocks and wage differentials across space—with or without borders. These shifts can occur across cities, metro areas, regions, or countries, i.e. *any geography* that is spatially connected. These results are, therefore, informative about a broad range of labor market settings and regional development patterns within and across countries. Given the dynamic nature of local labor markets and their sensitivity to economic changes, understanding these forces is crucial for predicting and shaping labor market interactions and community growth and development. Additionally, similar effects could arise if policies directly reduce competition barriers, such as competition or migration policies, or changes in currency exchange rates as they also impact wage differentials and workers' outside options.

As national competition authorities push for increased labor market competition across regions, and as governments establish commissions to promote local labor market competition (e.g., the 2022 Economic Report of the President of the United States), it is vital to understand the broader effects on communities. This knowledge will help us grasp the wider implications of labor competition for social cohesion and predict the future of work in a more interconnected world. Our study on the Sweden-Norway border offers a unique opportunity to isolate and identify the effects of labor market dynamics that are relevant regionally and globally. Based on our findings, a promising area for future research is to explore the consequences of these competition dynamics for individual workers (those who benefit, those left behind, and those who move) and their effects on aggregate productivity, allocative efficiency, and economic dynamism.

References

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association*, 105(490): 493–505.

Arkhangelsky, Dmitry, Susan Athey, David A Hirshberg, Guido W Imbens, and Stefan Wager. 2021. "Synthetic Difference-in-Differences." *American Economic Review*, 111(12): 4088–4118.

Autor, David, David Dorn, and Gordon Hanson. 2016. "The China Shock: Learning from Labor-Market Adjustments to Large Changes in Trade." *Annual Review of Economics*, 8 205–240.

Autor, David, David Dorn, and Gordon H Hanson. 2021. "On the Persistence of the China Shock." *NBER working paper 29401*.

Autor, David, David Dorn, Gordon Hanson, and Kaveh Majlesi. 2020. "Importing Political Polarization? The Electoral Consequences of Rising Trade Exposure." *American Economic Review*, 110(10): 3139–3183.

Azar, José, Ioana Marinescu, Marshall Steinbaum, and Bledi Taska. 2020. "Concentration in US labor Markets: Evidence from Online Vacancy Data." *Labour Economics*, 66, p. 101886.

Beaudry, Paul, David A Green, and Benjamin Sand. 2012. "Does Industrial Composition Matter for Wages? A Test of Search and Bargaining Theory." *Econometrica*, 80(3): 1063–1104.

Beerli, Andreas, Jan Ruffner, Michael Siegenthaler, and Giovanni Peri. 2021. "The Abolition of Immigration Restrictions and the Performance of Firms and Workers: Evidence from Switzerland." *American Economic Review*, 111(3): 976–1012.

Bhuller, Manudeep, Karl Ove Moene, Magne Mogstad, and Ola L Vestad. 2022. "Facts and Fantasies About Wage Setting and Collective Bargaining." *Journal of Economic Perspectives*, 36(4): 29–52.

Borjas, George J. 2003. "The Labor Demand curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market." *The Quarterly Journal of Economics*, 118(4): 1335–1374.

Borusyak, Kirill, Rafael Dix-Carneiro, and Brian Kovak. 2022. "Understanding Migration Responses to Local Shocks." *Available at SSRN 4086847*.

Bütikofer, Aline, Katrine V Løken, and Alexander Willén. 2022. "Building Bridges and Widening Gaps." *The Review of Economics and Statistics* 1–44.

Caldwell, Sydnee, and Oren Danieli. 2024. "Outside Options in the Labour Market." *Review of Economic Studies*.

Caldwell, Sydnee, and Nikolaj Harmon. 2019. "Outside Options, Bargaining, and Wages: Evidence from Coworker Networks."

Card, David. 1990. "The impact of the Mariel boatlift on the Miami labor market." *ILR Review*, 43(2): 245–257.

Card, David. 2022. "Who Set Your Wage?" *American Economic Review*, 112(4): 1075–90.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer. 2019. "The Effect of Minimum Wages on Low-Wage Jobs." *The Quarterly Journal of Economics*, 134(3): 1405–1454.

Dale-Olsen, Harald. 2024. "Technological Development, Market Power, and the Role of Unions."

Dicarlo, Emanuele. 2022. "How Do Firms Adjust to Negative Labor Supply Shocks? Evidence from Migration Outflows."

Djourelova, Milena, Ruben Durante, and Gregory J Martin. 2025. "The impact of online competition on local newspapers: Evidence from the introduction of Craigslist." *Review of Economic Studies*, 92(3): 1738–1772.

Dodini, Samuel, Michael Lovenheim, Kjell Salvanes, and Alexander Willén. 2024. "Monopsony, Job Tasks and Labour Market Concentration." *The Economic Journal*, 134(661): 1914–1949.

Dustmann, Christian, Uta Schönberg, and Jan Stuhler. 2016. "The Impact of Immigration: Why Do Studies Reach Such Different Results?" *Journal of Economic Perspectives*, 30(4): 31–56.

Ekeland, Anders. 2017. "Sysselsatte i petroleumsnæringene og relaterte næringer 2016."Technical report, Statistisk sentralbyrå.

Enke, Benjamin. 2020. "Moral Values and Voting." *Journal of Political Economy*, 128(10): 3679–3729.

Fetzer, Thiemo. 2019. "Did Austerity Cause Brexit?" *American Economic Review*, 109(11): 3849–86.

Foged, Mette, and Giovanni Peri. 2016. "Immigrants' Effect on Native Workers: New Analysis on Longitudinal Data." *American Economic Journal: Applied Economics*, 8(2): 1–34.

Gyöngyösi, Győző, and Emil Verner. 2022. "Financial Crisis, Creditor-Debtor Conflict, and Populism." *The Journal of Finance*, 77(4): 2471–2523.

Hafner, Flavio. 2021. "Labor Market Competition, Wages and Worker Mobility."

Harasztosi, Peter, and Attila Lindner. 2019. "Who Pays for the Minimum Wage?" *American Economic*

Review, 109(8): 2693–2727.

Hirsch, Boris, and Elke J Jahn. 2015. "Is There Monopsonistic Discrimination Against Immigrants?" *ILR Review*, 68(3): 501–528.

Le Barbanchon, Thomas, Roland Rathelot, and Alexandra Roulet. 2021. "Gender Differences in Job Search: Trading Off Commute Against Wage." *The Quarterly Journal of Economics*, 136(1): 381–426.

Manning, Alan. 2003a. *Monopsony in Motion: Imperfect Competition in Labor Markets*.: Princeton University Press.

Manning, Alan. 2003b. "The Real Thin Theory: Monopsony in Modern Labour Markets." *Labour Economics*, 10(2): 105–131.

Neumark, David, and William L Wascher. 2008. *Minimum Wages*.: MIT press.

Ottaviano, Gianmarco IP, and Giovanni Peri. 2012. "Rethinking the Effect of Immigration on Wages." *Journal of the European Economic Association*, 10(1): 152–197.

Schubert, Gregor, Anna Stansbury, and Bledi Taska. 2020. "Monopsony and Outside Options." *Available at SSRN*.

Steinmayr, Andreas. 2021. "Contact Versus Exposure: Refugee Presence and Voting for the Far Right." *Review of Economics and Statistics*, 103(2): 310–327.

von Brasch, Thomas, Håvard Hungnes, and Birger Strø m. 2018. "Ringvirkninger av petroleumsnæringen i norsk økonomi: Basert på endelige nasjonalregnskapstall for 2015."Technical report, Statistisk sentralbyrå.

Wilson, Riley. Forthcoming. "The Isolated States of America: Home State Bias and the Impact of State Borders on Mobility." *Journal of Labor Economics*, URL: https://doi.org/10.1086/732768, DOI: http://dx.doi.org/10.1086/732768.

Tables and Figures

Table 1: Firm Response: Sweden

Panel A: Workers and Earnings			
	Number of Workers (1)	Firm Exit (2)	Average Earnings (3)
Phase In	-0.192	-0.000	-743.593
	(0.123)	(0.002)	(1825.443)
Full Exposure	-0.327*	0.007***	3633.630
	(0.192)	(0.002)	(2921.034)
Observations	414644	549438	577998
Mean	5.172	0.042	185987
Panel B: Value Added and Distribution of Income			
	Value Added (1)	Value Added Per Worker (2)	Value-added earnings gap (3)
Phase In	-235.36***	-44.95***	-43.46***
	(79.35)	(13.47)	(13.64)
Full Exposure	-351.26***	-71.05**	-73.798**
	(130.664	(30.39)	(30.59)
Observations	414644	414644	414644
Mean	2607.2	608.9	423.2

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Value added and value-added–earnings gap are measured in 1,000s SEK.

Table 2: Municipality Response: Sweden

Panel A: Core Labor Market

	Employment Norway (1)	Employment Sweden (2)	Employment Total (3)	Unemployment Benefits (4)	Average Earnings (5)
Phase In	0.010***	-0.008**	0.001	-0.015**	4300.8**
	(0.002)	(0.004)	(0.003)	(0.006)	(1924.7)
Full Exposure	0.033***	-0.018**	0.008	-0.021**	11499.5***
	(0.004)	(0.007)	(0.005)	(0.009)	(3339.3)
Mean	0.008	0.85	0.85	0.14	181729

Panel B: Equality

	P10 (1)	P50 (2)	P90 (3)
Phase In	236.0	2132.4	10919.0***
	(126.9)	(1895.7)	(3176.6)
Full Exposure	364.6	6804.1**	22939.2***
	(240.2)	(3210.8)	(5411.3)
Mean	35.5	191998.2	338015.1

Panel C: Municipality Population and Business Activity

	Population (1)	Number Workers (2)	Firms 3+ (3)	Firms 5+ (4)	Firms 10+ (5)	Firms 20+ (6)
Phase In	-111.0	-17.9	-11.2**	-7.3***	-1.1	-0.80
	(77.1)	(64.2)	(4.6)	(2.68)	(1.38)	(1.03)
Full Exposure	-552.0**	-323.4*	-24.6***	-18.7***	-5.1**	-4.6***
	(176.0)	(215.0)	(1.72)	(1.21)	(1.62)	(1.37)
Mean	14628	12308	246.1	139.8	64.3	30.2

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table 3: Municipality Composition Response: Sweden

	Low Skill (1)	High Skill (2)	Young (3)	Old (4)	Female (5)	With Children (6)	Married (7)
Phase In	0.002	-0.002	0.001	0.002	0.002	-0.001	-0.022***
	(0.002)	(0.002)	(0.003)	(0.001)	(0.001)	(0.003)	(0.004)
Full Exposure	0.001	-0.004	0.003	0.002	0.003	-0.003	-0.021***
	(0.003)	(0.002)	(0.005)	(0.001)	(0.002)	(0.005)	(0.005)
Mean	0.146	0.239	0.347	0.035	0.482	0.489	0.409

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Outcomes are measured as shares of total population in each year. Means are calculated in the year prior to the shock (2004). Observations: 967

Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table 4: Firm Response: Norway

Panel A: Workers and Earnings

	Number of Non-Commuter Workers	Firm Exit	Average Domestic Earnings
	(1)	(2)	(3)
Phase In	-0.297	0.001	-4.955***
	(0.215)	(0.004)	(1.724)
Full Exposure	-0.880**	0.007	-10.048***
	(0.372)	(0.005)	(3.072)
Observations	261,657	246,929	261,629
Mean	8.75	0.09	289

Panel B: Value Added and value-added–earnings gap

	Value Added	Value Added Per Domestic Worker	Value-added Earnings Gap	Labor Costs /Revenue
	(1)	(2)	(3)	(4)
Phase In	-347.8	11.68	16.696	-0.005**
	(287.6)	(24.31)	(24.220)	(0.002)
Full Exposure	-253.5	43.19*	53.333**	-0.006**
	(654.4)	(22.64)	(22.772)	(0.003)
Observations	261,657	261,657	261,629	259,832
Mean	5,892	514	155.3	0.318

Source: Authors' calculations of Norwegian registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Monetary amounts (e.g. personnel costs, earnings, value added) are in thousands of Norwegian kroner.

Table 5: Municipality Response: Norway

Panel A: Core Labor Market

	Employment Domestic+ Commuters (1)	Employment Domestic (2)	Commuters/ FT Domestic (3)	Unemployment Domestic (4)	Average Earnings Domestic (5)	Employment Norwegian (6)
Phase In	-0.005	-0.010***	0.011**	0.001	-3024**	-0.011***
	(0.004)	(0.003)	(0.005)	(0.002)	(1190)	(0.003)
Full Exposure	-0.007	-0.021***	0.048***	0.000	-3338	-0.023***
	(0.007)	(0.004)	(0.013)	(0.003)	(3044)	(0.005)
Mean	0.73	0.71	0.03	0.05	340878	0.72

Panel B: Equality

	P10 (1)	P50 (2)	P90 (3)
Phase In	-1690.6	-2833.0**	-6896.7**
	(1413.8)	(1084.4)	(2649.3)
Full Exposure	351.4	-2932.4	-13301.1**
	(2166.2)	(2664.6)	(5738.4)
Mean	174533	326882	500843

Panel C: Municipality Population and Business Activity

	Population (1)	FT Workers Domestic (2)	Firms 3+ (3)	Firms 5+ (4)	Firms 10+ (5)	Firms 20+ (6)
Phase In	30.3	-67.4	-1.96	-0.79	-0.12	-1.01
	(153.9)	(64.1)	(4.42)	(3.97)	(3.21)	(2.75)
Full Exposure	54.2	-141.3	-6.17	-2.50	-1.86	-3.33
	(370.9)	(118.3)	(6.5)	(5.9)	(5.1)	(4.4)
Mean	10664	3800	195	146	98	71

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations (mun*year): 1,316 except Panel A columns 1-3, which has 1,144 observations.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

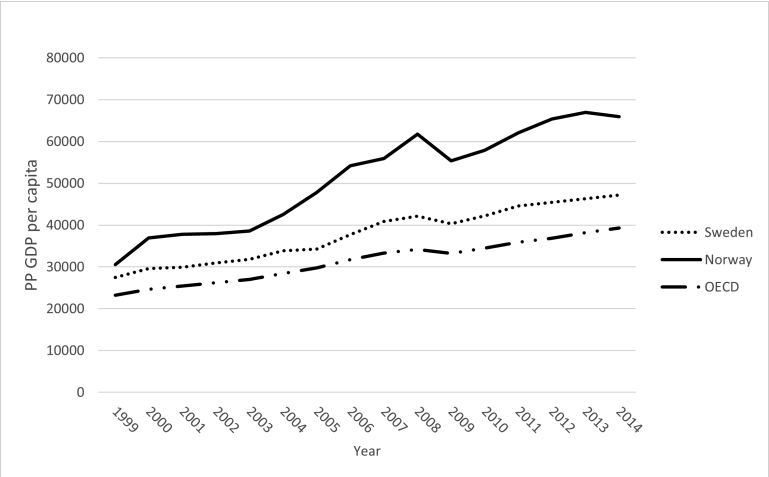
Table 6: Spatial Displacement and Spillovers: Norway

	Panel A: Treated vs Control				
	FT Workers Domestic	Employment municipality other	Employment Other municipality P75-90	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)
Phase In	-44.9	0.000	0.023***	-0.008***	-0.003
	(112.5)	(0.006)	(0.008)	(0.002)	(0.002)
Full Exposure	-123.4	0.003	0.025**	-0.005*	0.003
	(178.1)	(0.009)	(0.011)	(0.003)	(0.002)
Mean	5252	0.453	0.523	0.233	0.169
	Panel B: Buffer Zone vs Control				
	FT Workers Domestic	Employment municipality other	Employment Other municipality P75-90	Inflows	Outflows
	(1)	(2)	(3)	(4)	(5)
Phase In	206.7*	-0.002	-0.004	-0.001	-0.002
	(121.7)	(0.003)	(0.006)	(0.002)	(0.002)
Full Exposure	556.2**	-0.000	-0.009	0.004**	0.003
	(251.2)	(0.005)	(0.007)	(0.002)	(0.002)
Mean	4707	0.508	0.584	0.236	0.172

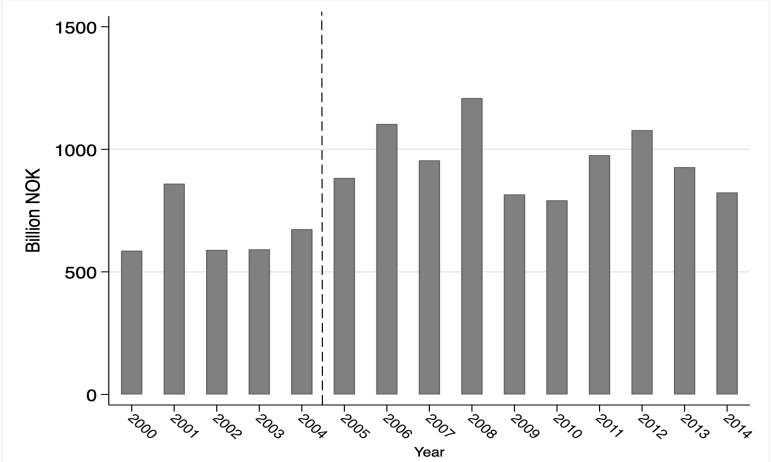
Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations (municipality by year): 1,316 in Panel A and 1,764 in Panel B.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Figure 1: Drivers of Commuting Pressure

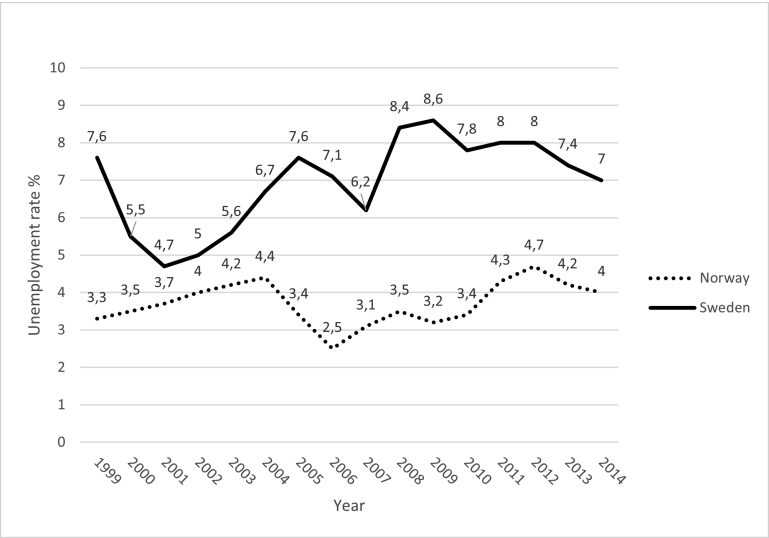
Panel A: GDP Growth



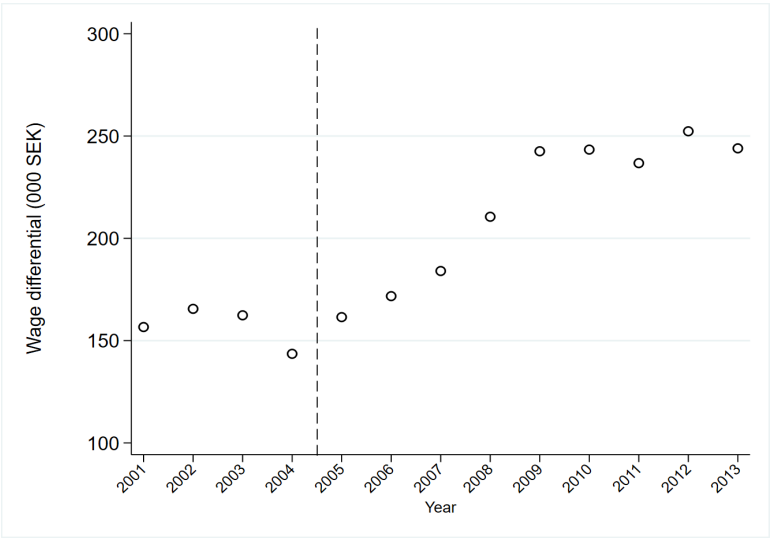
Panel B: Oil Income



Panel C: Unemployment Rates



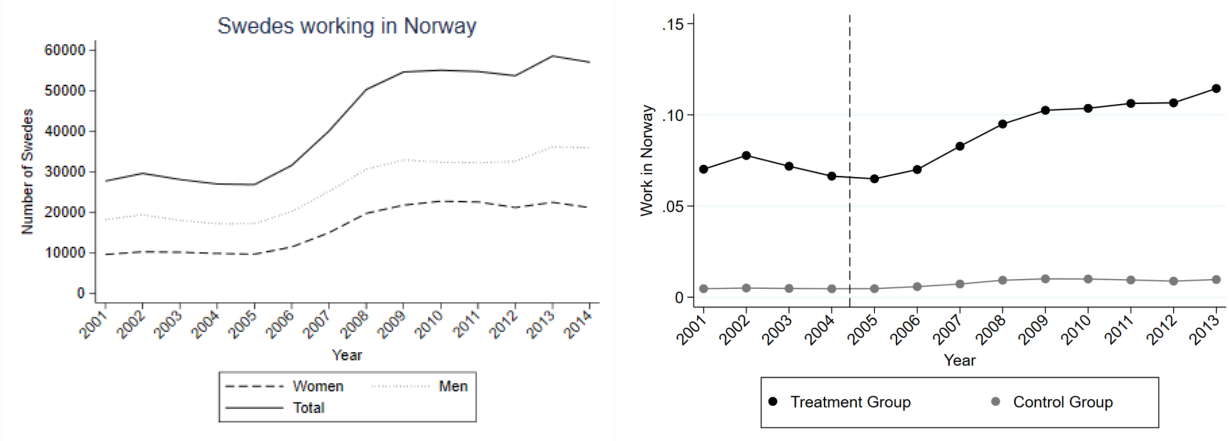
Panel D: Average Within-Occupation Earnings Gap



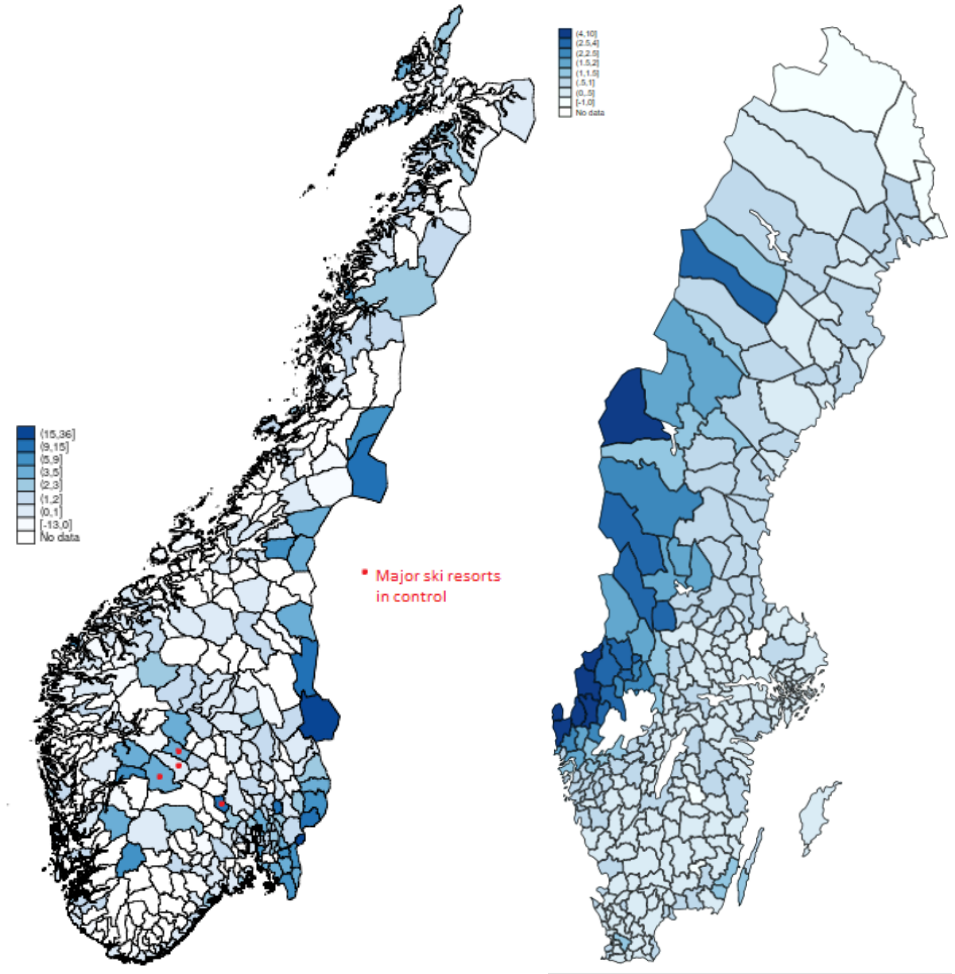
Source: OECD (Panels A and B) and authors' calculations of Norwegian and Swedish register data (Panels C and D).
Notes: Panels C and D are adjusted for contemporaneous exchange rates.

Figure 2: Commuting Patterns

Panel A: Total Cross-Border Commuters Panel B: Pr(Work in Norway)



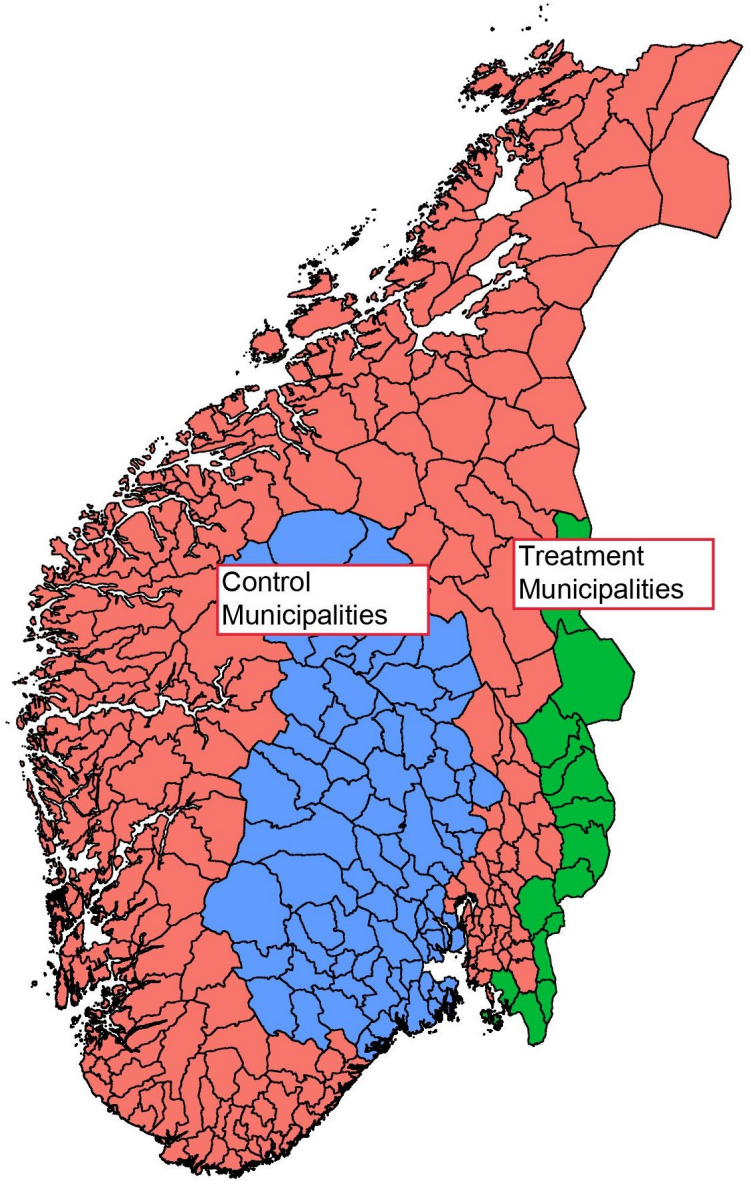
Panel C: Change in Share Swedish Commuters Panel D: Change in Share Commuting



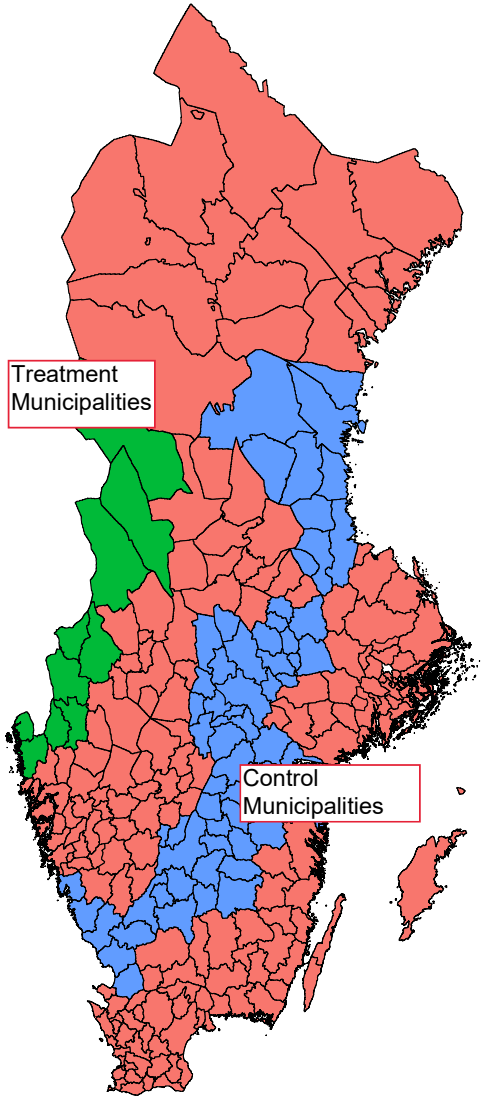
Source: Authors' calculations of Norwegian and Swedish register data.
Notes: Commuter shares in Panels C and D are calculated among all employed workers in our samples in base year 2005. Changes are for the 2005 to 2013 period.

Figure 3: Treatment and Control Groups

Panel A: Norway Side

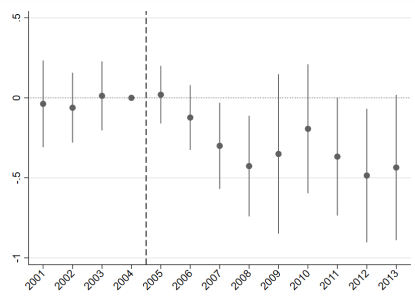


Panel B: Sweden Side

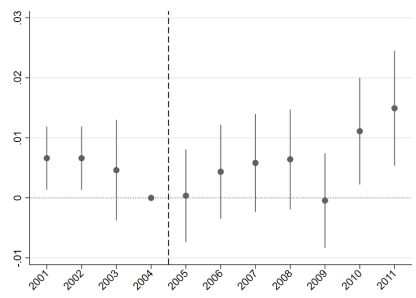


Source: Authors' selection of main treatment and control municipalities.
Notes: Treatment municipalities are municipalities with contact with the border within border counties. Control municipalities are those one county farther from the border.

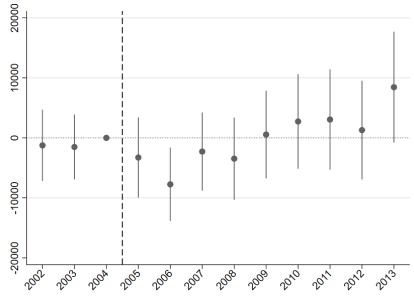
Figure 4: Sweden - Firms, Event Studies - Main Outcomes



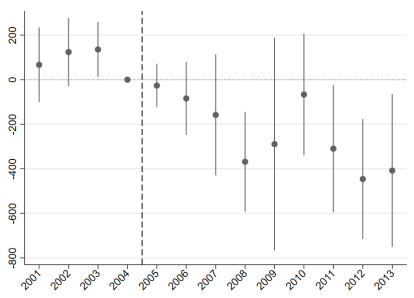
(a) Workers



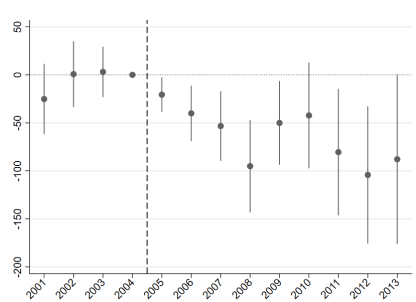
(b) Pr(Exit)



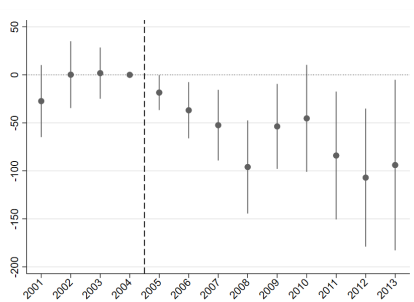
(c) Average Annual Earnings, Incumbents



(d) Firm Value Added



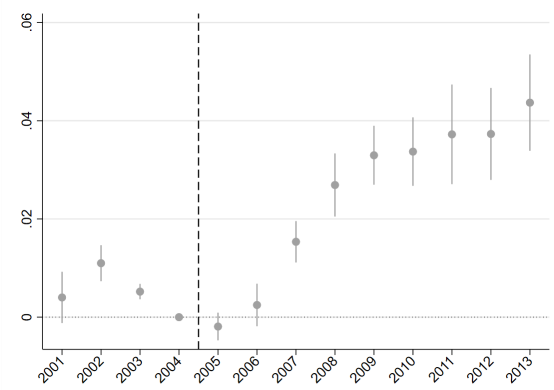
(e) Value Added Per Worker



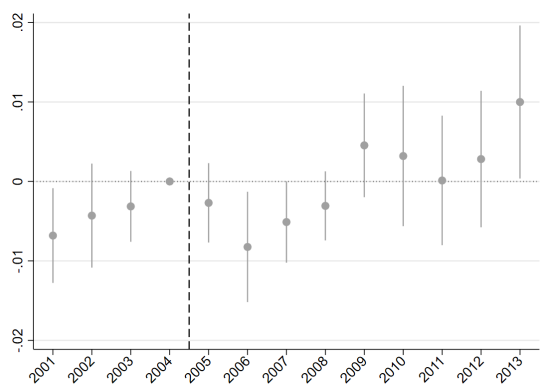
(f) Value-Added Earnings Gap (VA/Worker - Avg. Earnings

Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1 with data at the firm-municipality level. Estimates include fixed effects for firm, municipality, and year, and estimates are weighted by the share of firm employment in each municipality. Bars represent 95% confidence intervals. Standard errors clustered at the firm-by-municipality level.

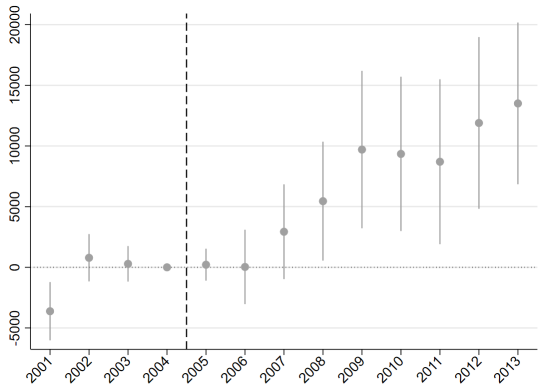
Figure 5: Sweden - Municipalities, Event Studies



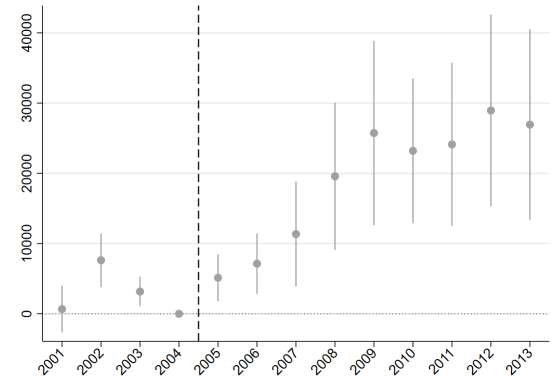
(a) Employment Norway



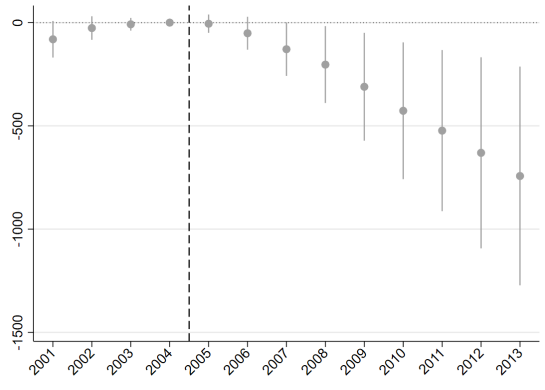
(b) Employment Total



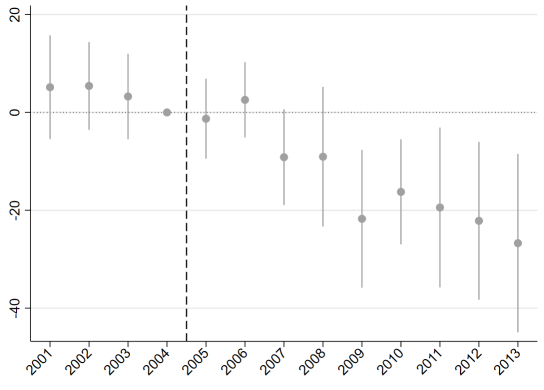
(c) Average Earnings



(d) P90



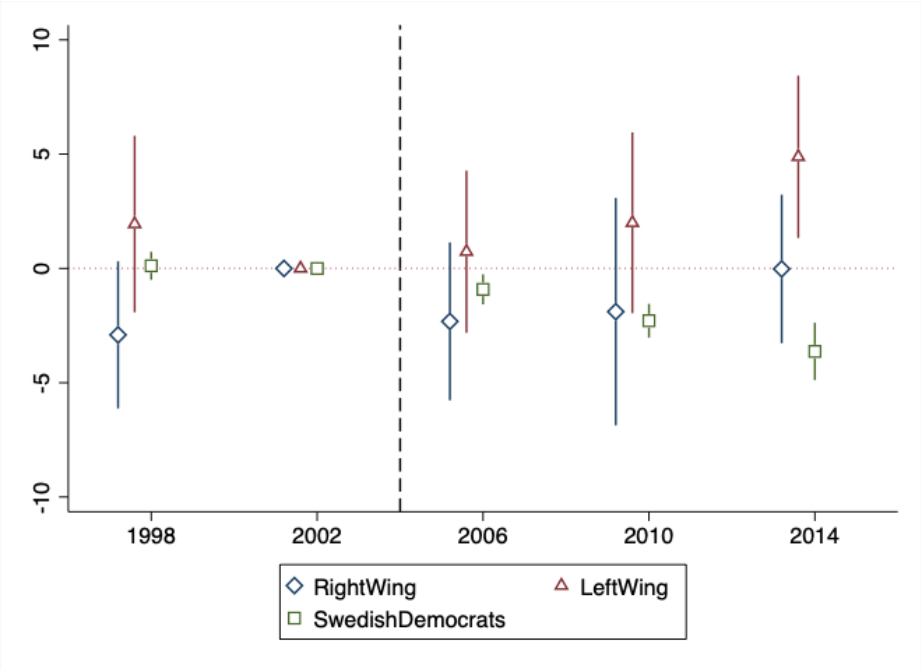
(e) Population



(f) Firms 5+

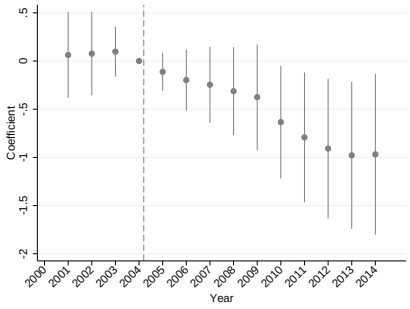
Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure 6: Political Outcomes in Sweden

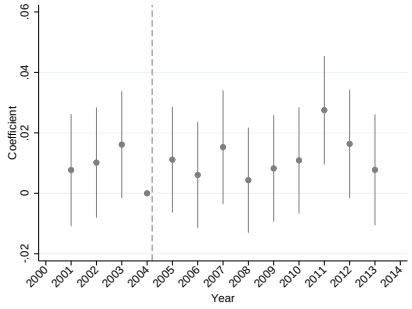


Source: Authors' calculations of municipality voter data in Sweden.
Notes: "Right Wing" consists of Moderaterna, Liberalerna, Kristdemokraterna, and Centerpartiet; the Left Wing consists of Socialdemokraterna, Vansterpartiet, and Miljopartiet.

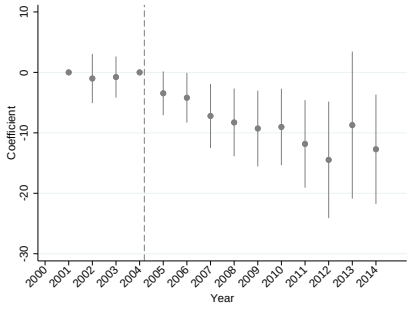
Figure 7: Norway - Firms, Event Studies - Main Outcomes



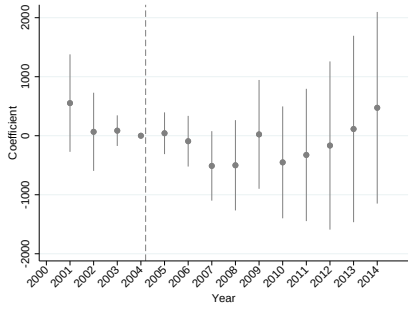
(a) Workers



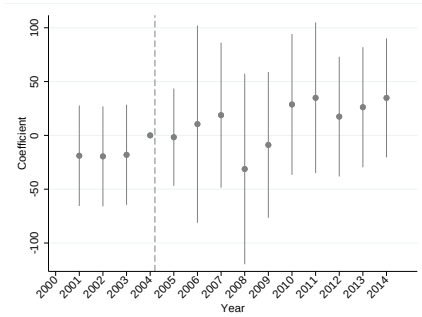
(b) Pr(Exit)



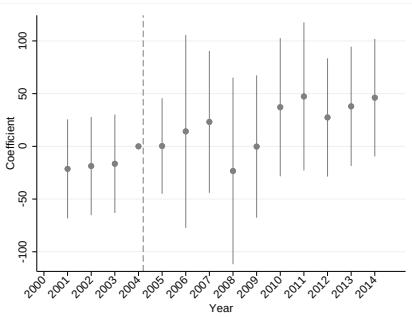
(c) Average Annual Earnings, Incumbents



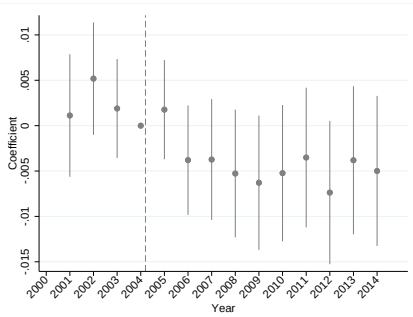
(d) Firm Value Added



(e) Value Added Per Worker



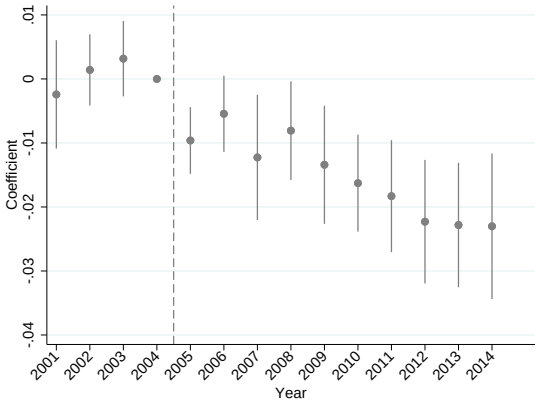
(f) Value-Added Earnings Gap (VA/Worker - Avg. Earnings



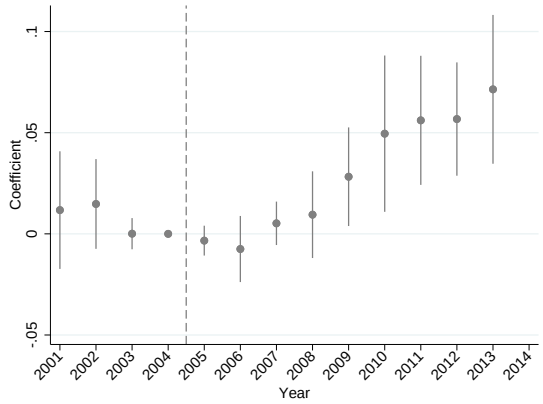
(g) Labor Share of Revenue

Source: Authors' calculations of Norwegian register data.
Notes: Coefficients from Equation 1 with data at the firm-municipality level. Estimates include fixed effects for firm, municipality, and year, and estimates are weighted by the share of firm employment in each municipality. Bars represent 95% confidence intervals. Standard errors clustered at the firm-by-municipality level.

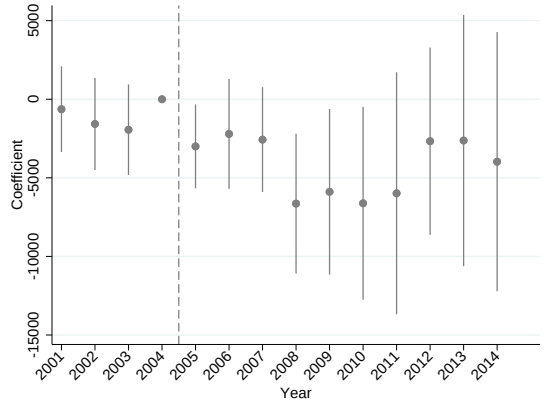
Figure 8: Norway - Municipalities, Event Studies



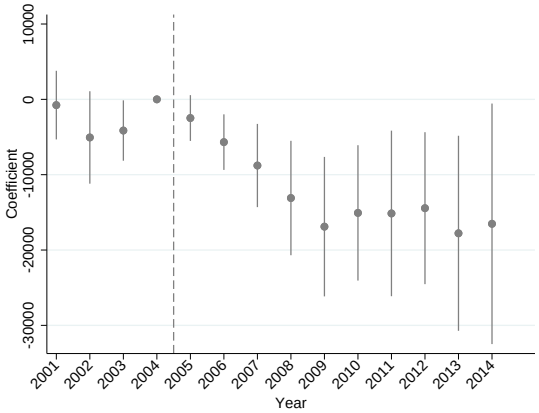
(a) Employment Domestic



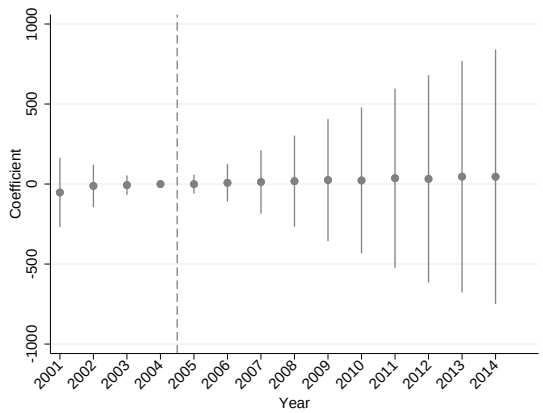
(b) Commuters/FT Domestic



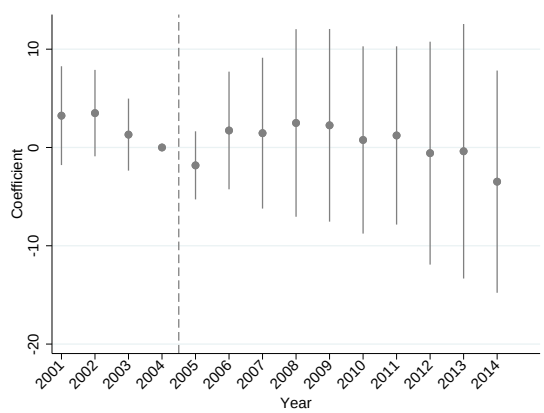
(c) Average Earnings Domestic



(d) P90



(e) Population



(f) Firms 5+

Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

A Online Appendix (not for publication)

Table A1: Sample Summary Statistics - Sweden

	Panel A: Individual Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Working in Norway	0.09	0.28	0.01	0.08
Working in Sweden	0.80	0.40	0.85	0.36
Working Overall	0.86	0.35	0.85	0.35
Unemployment Benefits	0.12	0.05	0.10	0.04
Annual Earnings (1,000s SEK)	198.3	153.6	204.1	169.0
Individual Observations	627,661		10,951,136	
	Panel B: Municipality Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
90th Percentile (1,000s)	364.9	57.2	361.5	48.1
50th Percentile (1,000s)	211.3	30.3	217.1	28.8
10th Percentile (1,000s)	0	0	201.1	1385.3
Population	4828	2360	13084	16977
Workers	4139	2006	11165	14385
Firms (3+ workers)	84	44	234	303
Firms (5+ workers)	49	24	134	174
Firms (10+ workers)	23	12	61	80
Firms (20+ workers)	10	6	29	38
	Panel C: Firm Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Number of Workers	4	17	5	23
Exit Probability	0.12	0.33	0.12	0.32
Average Worker Earnings (1,000s)	214.7	176.5	212.6	166.0
Average Entry Earnings (1,000s)	207.8	166.8	207.2	163.1
Average Incumbent Earnings	265.4	176.5	256.8	161.9
Firm Value-Added (1,000s)	2102.8	10846.3	2886.6	16103.4
Firm Value-Added per Worker (1,000s)	694.2	1299.8	850.4	1956.1
Value-added–Earnings Gap (1,000s)	473.7	1313.5	637.4	1961.9

Note: Authors' calculations of register data from Sweden as described in Section 3.1.

Table A2: Sample Summary Statistics - Norway

	Panel A: Municipality Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Employment Rate	0.694	0.032	0.715	0.031
Unemployment Benefits	0.055	0.019	0.053	0.019
Commuters/ FT Domestic Workers	0.091	0.087	0.018	0.042
Annual Earnings (1,000s NOK)	332.70	58.54	342.43	62.33
90th Percentile	480.11	87.67	504.78	101.48
50th Percentile	321.11	55.23	327.98	57.19
10th Percentile	174.69	32.61	174.50	31.15
Population	11431	13066	10518	12190
Non-Commuter Workers	3786	4933	3802	5453
Number of Firms (3+ workers)	192.89	218.26	195.64	250.75
Number of Firms (5+ workers)	142.30	160.17	146.46	189.62
Number of Firms (10+ workers)	95.46	108.95	98.52	128.71
Number of Firms (20+ workers)	70.18	80.43	71.05	93.59

	Panel B: Firm Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Non-Commuter Workers	8.23	22.49	8.53	26.54
Exit Probability	0.10	0.31	0.11	0.31
Average Worker Earnings (1,000s)	337.99	165.12	357.95	183.23
Average Entry Earnings (1,000s)	273.07	169.89	287.18	175.90
Average Incumbent Earnings (1,000s)	361.29	160.71	383.94	180.67
Firm Value-Added (1,000s)	5612.8	63978.6	5940.0	71395.4
Firm Value-Added per Non-Commuter Worker (1,000s)	494.26	1170.32	517.45	2288.22
Value-added–Earnings Gap (1,000s)	156.28	1162.80	159.51	2273.55

Note: Authors' calculations of register data from Norway as described in Section 3.1.

Table A3: Firm Response: Sweden, EU Expansion Bartik Control

Panel A: Workers and Earnings

	Number of Workers (1)	Firm Exit (2)	Average Earnings (3)
Phase In	-0.659**	-0.001*	1931.581
	(0.189)	(0.002)	(2278.580)
Full Exposure	-1.796***	0.006***	8843.689***
	(0.290)	(0.002)	(3325.682)
Observations	414644	577998	577998

Panel B: Value Added and Distribution of Income

	Value Added (1)	Value Added Per Worker (2)	Value-added Earnings Gap (3)
Phase In	-513.882***	-91.291***	-92.168***
	(101.643)	(17.374)	(17.615)
Full Exposure	-1247.968***	-221.138***	-227.759***
	(196.434)	(35.431)	(35.714)
Observations	414644	414644	414644
Mean			

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Value added and value-added–earnings gap are measured in 1,000s SEK.

Table A4: Firm Response: Sweden, Industry Bartik Control

Panel A: Workers and Earnings

	Number of Workers (1)	Firm Exit (2)	Average Earnings (3)
Phase In	-0.633**	0.000	1583.092
	(0.089)	(0.002)	(2294.102)
Full Exposure	-1.688**	0.008***	7740.575**
	(0.275)	(0.002)	(3378.010)
Observations	414644	577998	577998

Panel B: Value Added and Value-added–Earnings Gap

	Value Added (1)	Value Added Per Worker (2)	Value-added Earnings Gap (3)
Phase In	-563.840***	-88.133***	-88.598***
	(106.148)	(17.291)	(17.534)
Full Exposure	-1354.349***	-210.560***	-215.695***
	(207.883)	(33.907)	(34.223)
Observations	414644	414644	414644

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Value added and value-added–earnings gap are measured in 1,000s SEK.

Table A5: Firm Response: Norway with EU Expansion Bartik Control

Panel A: Workers and Earnings

	Number of Non-Commuter Workers	Firm Exit	Average Domestic Earnings
	(1)	(2)	(3)
Phase In	-0.282	0.004	-4.705***
	(0.216)	(0.005)	(1.721)
Full Exposure	-0.826**	0.018***	-9.151***
	(0.376)	(0.006)	(3.058)
Observations	261,657	239,448	261,629
Mean	8.75	0.09	289

Panel B: Value Added and Value-added–Earnings Gap

	Value Added	Value Added Per Domestic Worker	Value-added Earnings Gap	Labor Share of Revenue
	(1)	(2)	(3)	(4)
Phase In	-336.473	11.432	16.196	-0.005**
	(289.190)	(24.296)	(24.209)	(0.002)
Full Exposure	-212.904	42.307*	51.538**	-0.006*
	(662.077)	(23.060)	(23.178)	(0.003)
Observations	261,657	261,657	261,657	259,832
Mean	5,892	514	155.3	0.318

Source: Authors' calculations of Norwegian registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Monetary amounts (e.g. personnel costs, earnings, value added) are in thousands of Norwegian kroner.

Table A6: Firm Response: Norway with Industry Bartik Control

Panel A: Workers and Earnings

	Number of Non-Commuter Workers	Firm Exit	Average Domestic Earnings
	(1)	(2)	(3)
Phase In	-0.329	0.004	-5.075***
	(0.217)	(0.005)	(1.726)
Full Exposure	-0.932**	0.018***	-10.240***
	(0.376)	(0.006)	(3.072)
Observations	261,657	239,448	261,629
Mean	8.75	0.09	289

Panel B: Value Added and Value Added Earnings Gap

	Value Added	Value Added Per Domestic Worker	Value Added Earnings Gap	Labor Share of Revenue
	(1)	(2)	(3)	(4)
Phase In	-430.656	12.379	17.515	-0.005**
	(295.021)	(24.304)	(24.219)	(0.002)
Full Exposure	-386.425	44.316**	54.643**	-0.007**
	(665.322)	(22.504)	(22.630)	(0.003)
Observations	261,657	261,657	261,629	259,832
Mean	5,892	514	155.3	0.318

Source: Authors' calculations of Norwegian registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Monetary amounts (e.g. personnel costs, earnings, value added) are in thousands of Norwegian kroner.

Table A7: Effects on Probability of Working in Norway, by Industry

	Agriculture, hunting and forestry	Fishing	Mining and quarrying except energy producing materials	Manufacturing
Full Exposure	0.020**	-0.027	0.002	0.054***
	(0.008)	(0.022)	(0.030)	(0.008)
Observations	206,931	2,655	11,776	1,938,026
	Electricity, gas and water supply	Construction	Wholesale and retail trade	Hotels and restaurants
Full Exposure	0.024**	0.038**	0.028**	0.036***
	(0.009)	(0.017)	(0.013)	(0.007)
Observations	66,837	139,531	585,022	1,253,137
	Transport, storage and communication	Financial intermediation	Real Estate, renting and business activities	Public administration and defense
Full Exposure	0.027***	0.061***	0.015	0.049***
	(0.006)	(0.013)	(0.016)	(0.009)
Observations	327,688	523,555	101,017	1,040,643
	Education	Health and social work	Other community, social and personal service activities	Activities of households
Full Exposure	0.028***	0.016***	0.041***	0.035***
	(0.005)	(0.005)	(0.010)	(0.008)
Observations	437,651	975,950	1,656,491	452,663

Source: Authors' calculations of register data from Sweden as described in Section 3.1.
Notes: Standard errors clustered at the municipality level.

Table A8: Firm Endline Outcomes: Sweden

	Net Revenues (1000SEK) (1)	Capital (1000SEK) (2)	Inventory (1000SEK) (3)
Phase In	-16.45***	242.20	-1785.86***
	(2.63)	(497.57)	(357.28)
Full Exposure	-29.94***	-574.31	-2871.07***
	(5.01)	(440.35)	(601.83)
Observations	488838	488838	488838
Mean	251	5672	15300

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level.

Table A9: Summary Statistics - Swedish Commuters vs Non-Commuters in Sample

	Commuters		Non-Commuters	
	Mean	SD	Mean	SD
Children Under 18	0.38	0.48	0.46	0.50
Age	36.7	10.4	39.0	10.4
Less than High School	0.12	0.33	0.16	0.37
College Degree or More	0.22	0.42	0.18	0.39
Earnings in Sweden (1,000s)	49.8	105.4	184.2	139.9
Female	0.28	0.45	0.50	0.50
Married	0.25	0.44	0.32	0.47
Employed in Sweden	0.38	0.49	0.84	0.36
Total Earnings (1,000s)	346.1	205.1	184.2	139.9

Authors' calculations of register data from Sweden as described in Section 3.1.

Table A10: Firm Response to Increased Labor Market Competition: Incumbents (Sweden)

	Incumbent Employment	Incumbent Earnings
	(1)	(2)
Phase In	-0.475***	2889.33
	(0.090)	(2914.07)
Full Exposure	-1.202***	11297.94***
	(0.205)	(3726.36)
Observations	542397	412359
Mean	3.886	220709

Source: Authors' calculations using Swedish registry data, 2001–2014.
Notes: Estimates come from Equation 2 and include firm, municipality, and year fixed effects. Standard errors are clustered at the firm-by-municipality level. Earnings are measured in SEK.

Table A11: Municipality Response Additional Outcomes: Sweden

Panel A: Equality

	P5010	P9050	P9010
	(1)	(2)	(3)
Phase In	1896.4	8786.6***	10682.9***
	(1894.9)	(2701.5)	(3173.7)
Full Exposure	6439.5**	16135.1***	22574.5***
	(3209.3)	(4250.5)	(5399.1)
Mean	191962.6	146052.4	338015.1

Panel B: Aggregate

	Aggregate Earnings (MSEK)	Income Taxes (MSEK)	Social Support (MSEK)	Income Taxes (pc) (1000SEK)	Social Support (pc) (1000SEK)	Combined Transfers (pc) (1000SEK)
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-227***	-103***	- 40***	0.021	-0.241	-0.220
	(74.1)	(28)	(11)	(0.874)	(1.036)	(0.748)
Full Exposure	-535***	-205***	-81***	-1.833	1.119	-0.715
	(172)	(54)	(23)	(1.210)	(1.615)	(1.371)
Mean	2123	771	152	67	18	85

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table A12: Firm Response to Increased Labor Market Competition: Incumbents (Norway)

	Incumbent Employment	Average Incumbent Earnings (1000s NOK)
	(1)	(2)
Phase In	-0.141	-5.789***
	(0.191)	(1.863)
Full Exposure	-0.754**	-10.400***
	(0.328)	(3.758)
Observations	261,657	217,429
Mean	6.96	304.2

Source: Authors' calculations using Norwegian registry data, 2001–2014.
Notes: Estimates come from Equation 2 and include firm, municipality, and year fixed effects. Standard errors are clustered at the firm-by-municipality level. Earnings are measured in 1000s NOK.

Table A13: Municipality Response Additional Outcomes: Norway

	P5010	P9050	P9010	Agg. Earnings (MNOK)
	(1)	(2)	(3)	(4)
Phase In	-1142.4	-4063.7	-5206.1*	-16.0
	(1568.5)	(2596.1)	(2977.5)	(126.9)
Full Exposure	-3283.8	-10368.7**	-13652.5**	-38.3
	(2745.5)	(3988.3)	(5638.3)	(280.2)
Mean	152349.7	173961.0	326310.7	1853.4

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations: 1,316 for every outcome.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level. Aggregate income is measured earned income from work by residents of the municipality age 20-64.

Table A14: Municipality Response: Sweden Within-Region Exposure

Panel A: Core Labor Market

	Employment Norway	Employment Sweden	Employment Total	Unemployment Benefits	Average Earnings
	(1)	(2)	(3)	(4)	(5)
Phase In	0.165***	-0.116***	0.003	-0.152**	55955.8***
	(0.021)	(0.038)	(0.033)	(0.062)	(20479.2)
Full Exposure	0.366***	-0.206**	0.077	-0.193***	123524.3***
	(0.042)	(0.069)	(0.047)	(0.094)	(30942.4)

Panel B: Equality

	P10	P50	P90
	(1)	(2)	(3)
Phase In	1525.2*	23384.7	139741.4***
	(802.7)	(20449.3)	(34829.3)
Full Exposure	3104.1	72938.4***	245591.4***
	(2115.8)	(30600.9)	(51195.0)

Panel C: Municipality Population and Business Activity

	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-1494.9*	-788.2	-124.1**	-93.6***	-32.0*	-8.1
	(874.6)	(727.9)	(50.1)	(33.0)	(16.6)	(10.7)
Full Exposure	-5735.8**	-3583.2*	-245.9***	-193.5***	-58.9**	-47.8***
	(2208.2)	(1821.5)	(84.8)	(55.0)	(24.0)	(11.6)

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: The table presents our estimates from a modified version of Equation2, where instead of binary treatment, we use the average predicted commuting probability in the municipality as a measure of treatment intensity. Using the individual data for those in the sample in 2004, we estimate linear probability models for commuting to Norway in the post-shock period based on demographics in each of our treated municipalities using the following pre-shock variables as predictors: age (bins), gender, marital status, presence of children under the age of 18, industry of work, education, total wage, and pre-shock cross-border commuting status.

Table A15: Industry Composition in Sweden, Treatment and Control

	Treatment	Control
Agriculture	0.025	0.024
Fishing	0.000	0.000
Mining and Quarrying	0.002	0.002
Manufacturing	0.162	0.164
Electric and Gas	0.006	0.006
Water	0.011	0.011
Construction	0.053	0.054
Wholesale and retail trade	0.121	0.120
Hotels and Restaurants	0.032	0.032
Transport, storage, communication	0.061	0.061
Financial intermediation	0.018	0.019
Real estate, renting and business activity	0.126	0.126
Public administration and defense	0.052	0.052
Education	0.103	0.101
Health and social work	0.156	0.158
Other Services	0.059	0.057
Panel B: Demographic Composition		
	Treated	Control
Average Age	38.99	38.96
Female	0.475	0.483
Less than High School	0.156	0.144
High School	0.640	0.612
Bachelors or More	0.204	0.244
Married	0.353	0.417
Has Child at Home	0.468	0.492

Source: Authors' calculations of Swedish registry data in 2004 before the commuting shock.

Table A16: Industry and Demographic Composition in Norway, Treatment and Control

Panel A: Industry Composition		
	Treatment	Control
Agriculture	0.013	0.010
Fishing	0.000	0.000
Mining and Quarrying	0.002	0.003
Manufacturing	0.183	0.164
Electricity, Gas, Water	0.009	0.010
Construction	0.083	0.075
Wholesale and Retail Trade	0.134	0.147
Hotels and Restaurants	0.017	0.027
Transportation, Storage, and Communication	0.052	0.056
Financial Intermediation	0.015	0.015
Real Estate, Renting, and Business Activity	0.069	0.076
Public Administration and Defense	0.080	0.067
Education	0.098	0.094
Health and Social Work	0.218	0.226
Other Services	0.027	0.030
Panel B: Demographic Composition		
	Treated	Control
Average Age	41.98	42.33
Female	0.493	0.501
Less than High School	0.225	0.196
High School	0.513	0.511
Bachelors or More	0.256	0.286
Married	0.588	0.581
Has Child at Home	0.631	0.634
Sweden-Born	0.017	0.008
Non-Western Immigrants	0.027	0.035

Source: Authors' calculations of Norwegian registry data in 2004 before the commuting shock.

Table A17: Sweden: Local Services Revenue and House Prices

	Total Revenue in Local Goods (1,000 SEK) (1)	Average House Price (1,000 SEK) (2)
Phase In	-185.45	-0.65
	(334.17)	(67.71)
Full Exposure	56.31	57.96
	(679.01)	(126.88)
Observations	967	962

Source: Authors' calculations of Swedish register data at the municipality level.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table A18: Firm Response: Sweden in Tradable Sector

Panel A: Workers and Earnings

	Number of Workers (1)	Firm Exit (2)	Average Earnings (3)
Phase In	-0.161	0.003	4186.262
	(0.214)	(0.002)	(2645.241)
Full Exposure	-0.339	0.010**	10687.05**
	(0.330)	(0.004)	(4400.295)
Observations	171723	178310	200702
Mean	6.59	0.028	186459.1

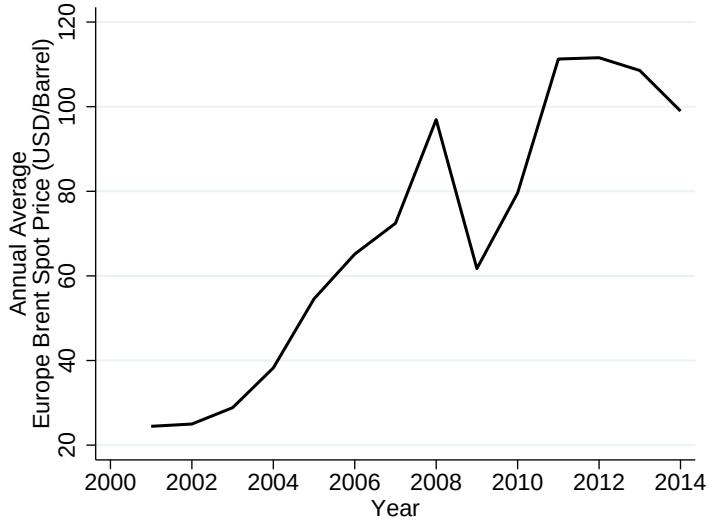
Panel B: Value Added and Distribution of Income

	Value Added (1)	Value Added Per Worker (2)	Value Added Earnings Gap (3)
Phase In	-167.52	-29.68*	-32.78**
	(156.71)	(15.78)	(15.94)
Full Exposure	-404.53**	-65.84**	-76.133***
	(202.63)	(28.86)	(29.28)
Observations	171723	171723	171723
Mean	3295.5	570.62	384.25

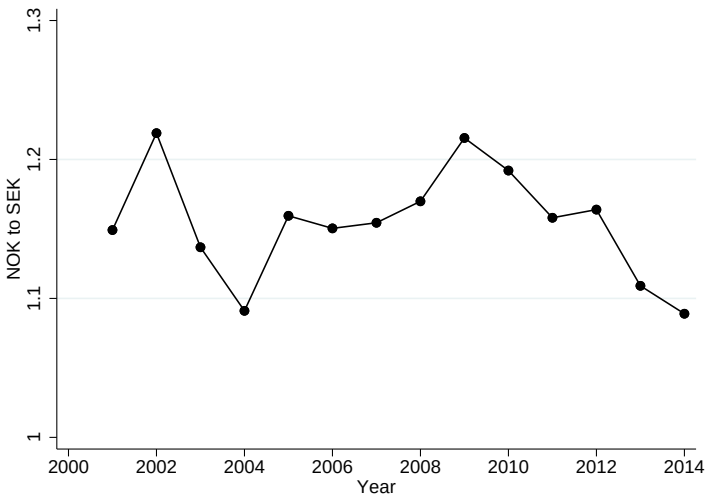
Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 and include fixed effects for firm, municipality, and year. Standard errors clustered at the firm-by-municipality level. Value added and value-added earnings gap are measured in 1,000s SEK.

Figure A1: Annual Oil Prices in Europe and NOK to SEK Exchange Rate

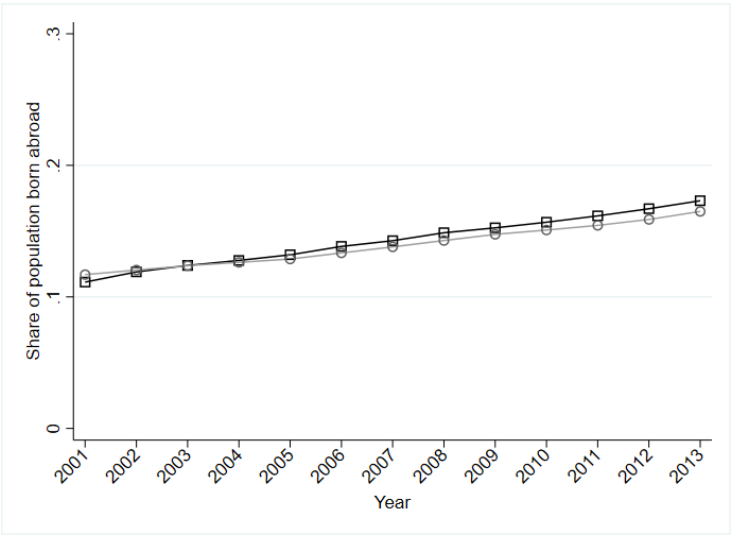
Panel A: Oil Prices in Europe



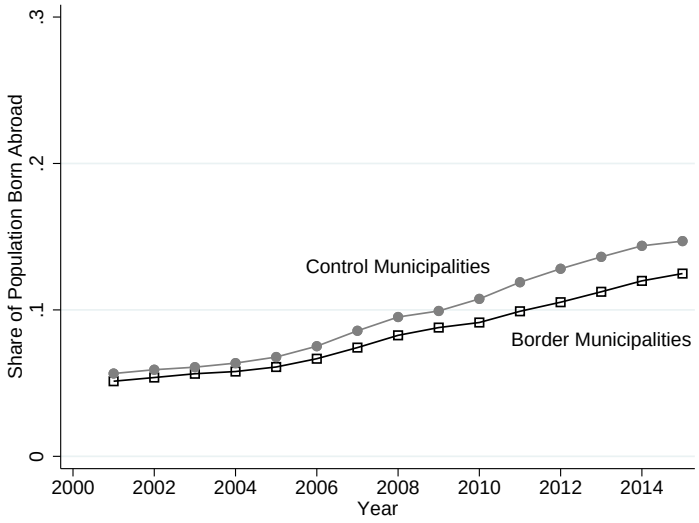
Panel B: NOK to SEK Exchange Rate



Panel C: Sweden Foreign-Born Share



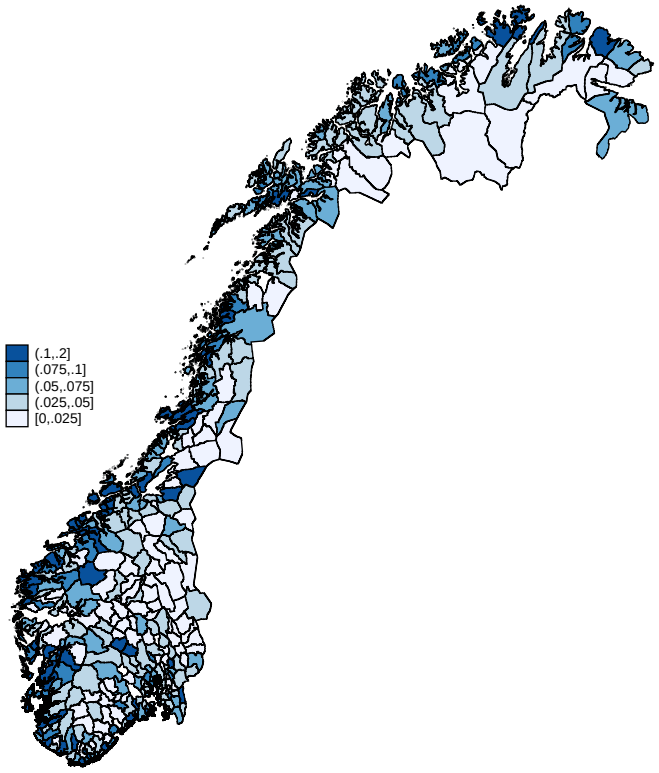
Panel D: Norway Foreign-Born Share



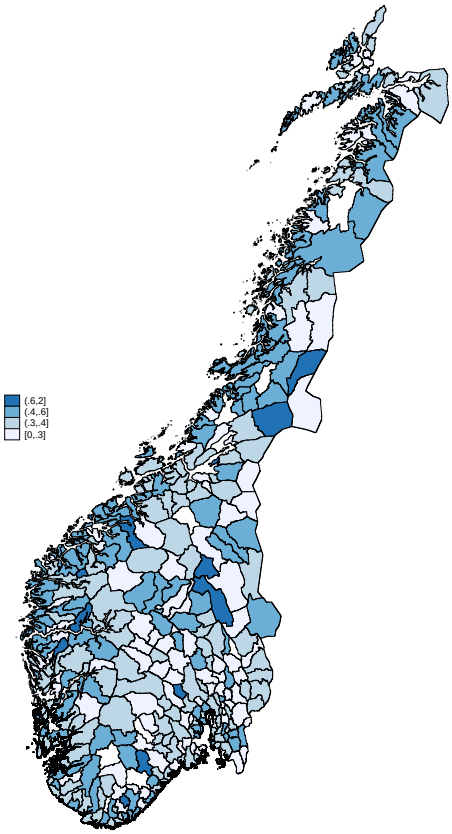
Source: Authors' calculations of register data from Sweden and Norway, US Energy Information Administration (oil prices) and Norges Bank (exchange rates).
Notes: Line depicts the annual average of Europe Brent spot prices in Panel A. Panel B line reflects the annual average exchange rate.

Figure A2: Spatial Distribution of Oil-Adjacent Industries, Earnings Growth

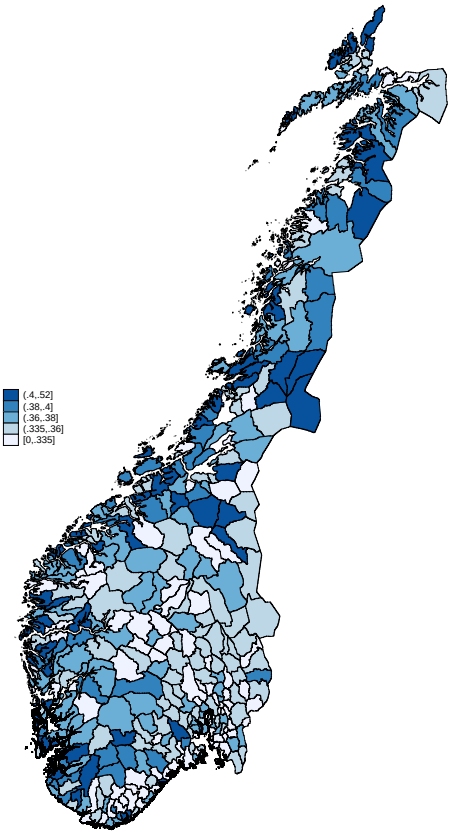
Panel A: Oil-Adjacent Industry Employment Share, 2005



Panel B: Change in Earnings, Oil-Adjacent

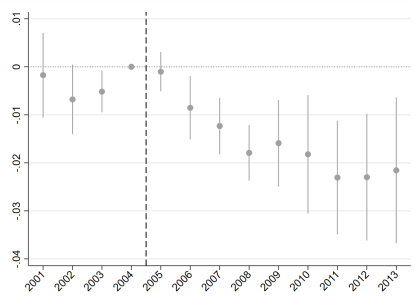


Panel C: Change in Earnings, All

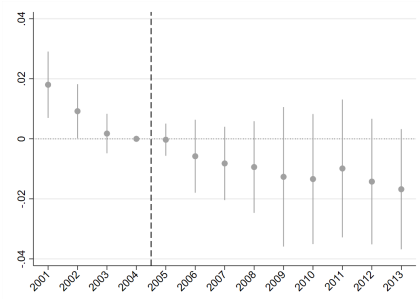


Source: Authors' calculations of register data from Norway.
Notes: "Oil-adjacent" industries include oil and gas extraction, petroleum refining, manufacture of fabricated metals, machinery, transport equipment, and autos, water transport, and supporting and auxiliary transport activities.

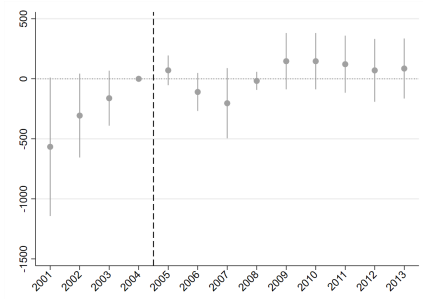
Figure A3: Sweden - Municipalities, Event Studies - Additional Outcomes



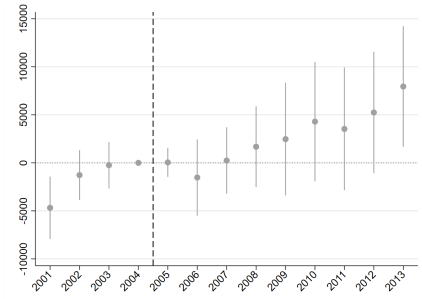
(a) Employment Sweden



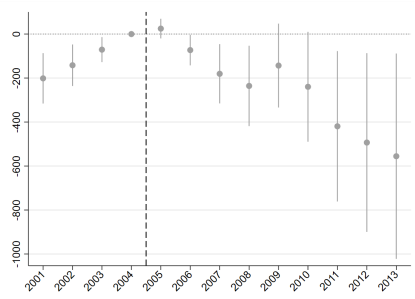
(b) Unemployment



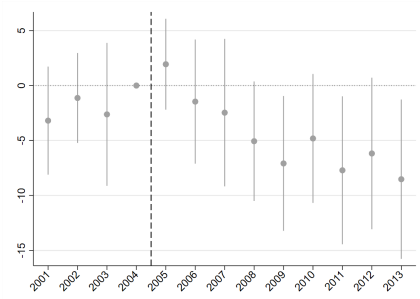
(c) P10



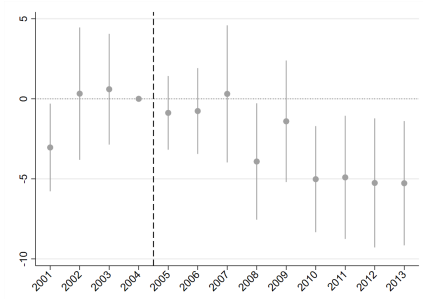
(d) P50



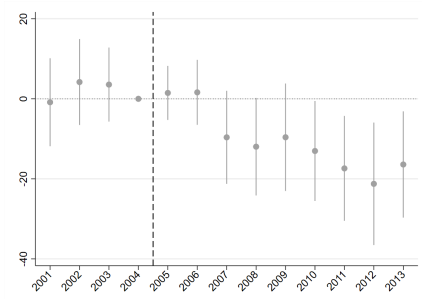
(e) Number of workers



(f) Firms 3+



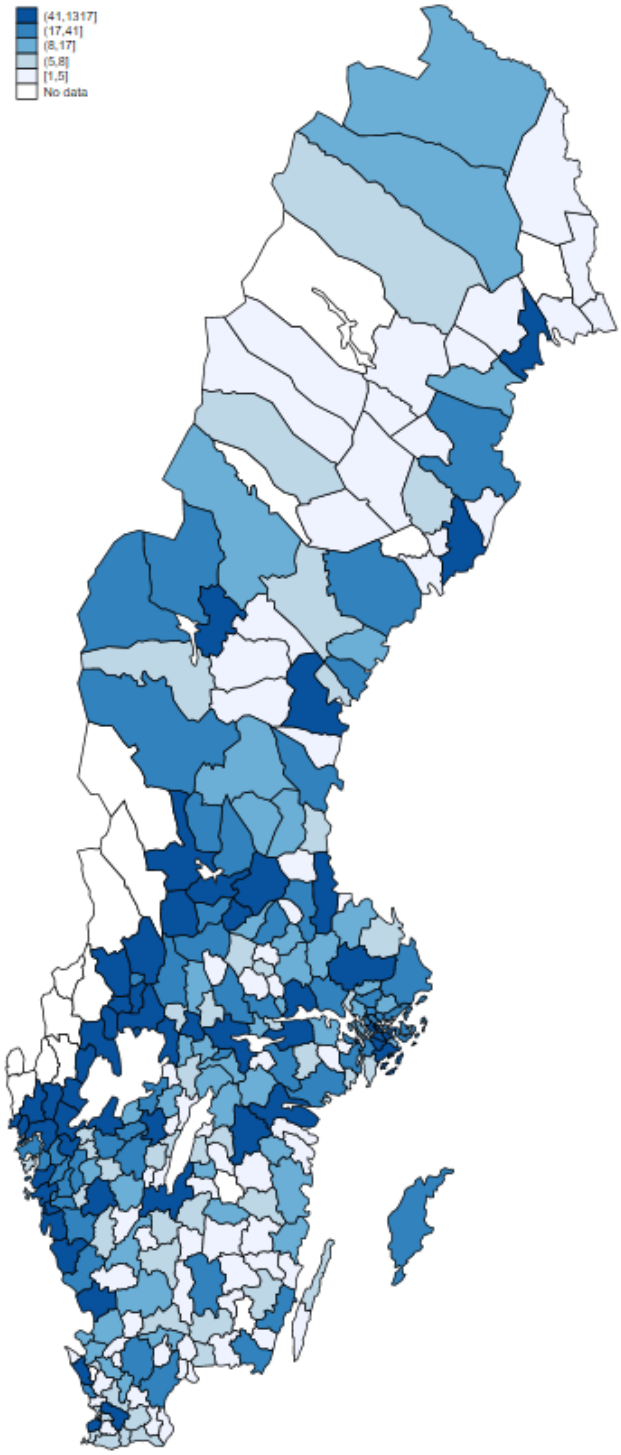
(g) Firms 10+



(h) Firms 20+

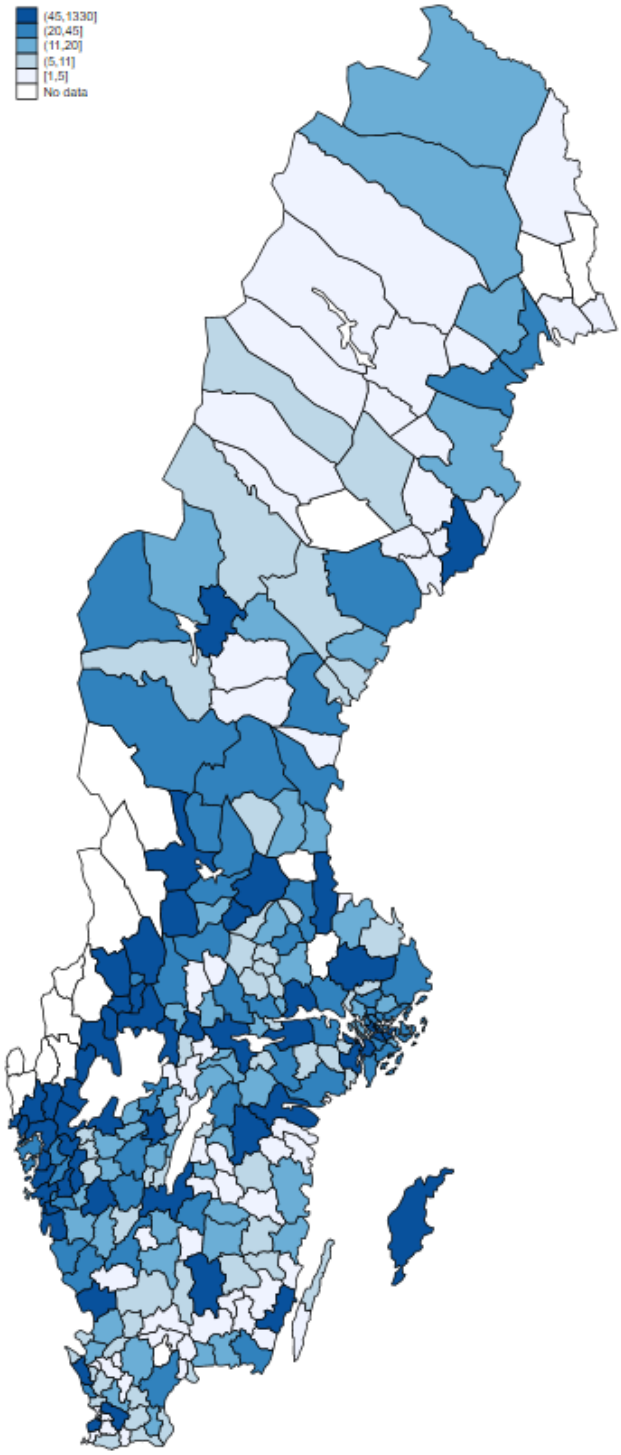
Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure A4: Where Did Swedes From Treatment Group Move After the Shock?



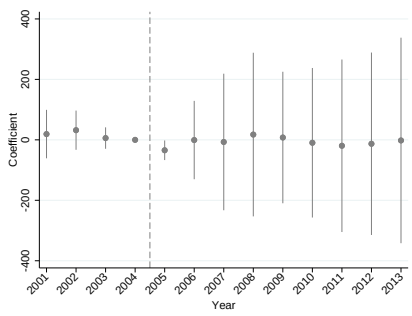
Source: Authors' calculations of Swedish register data.
Notes: Figure captures the number of workers moving from the treated municipalities on the border with Norway to each mapped municipality from 2005 to 2009.

Figure A5: Where Did Swedes From Treatment Group Move Before the Shock?

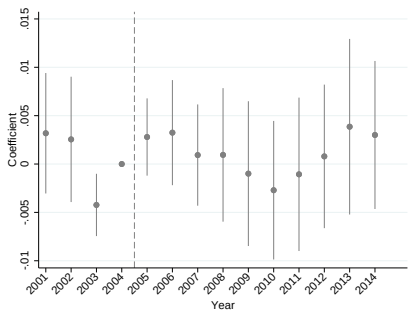


Source: Authors' calculations of Swedish register data.
Notes: Figure captures the number of workers moving from the treated municipalities on the border with Norway to each mapped municipality from 2001 to 2004.

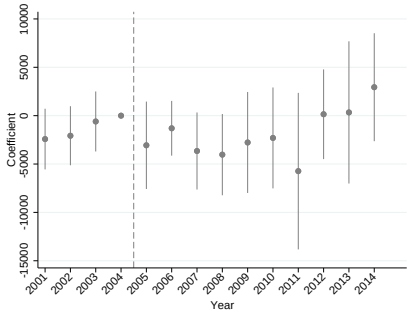
Figure A6: Norway - Municipalities, Event Studies - Additional Outcomes



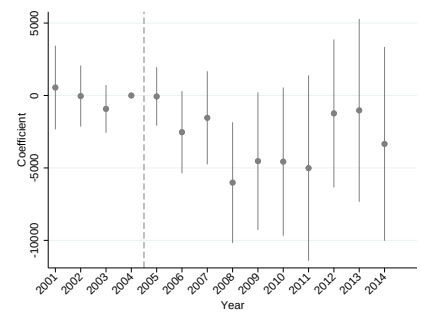
(a) Employment Domestic+Commuters



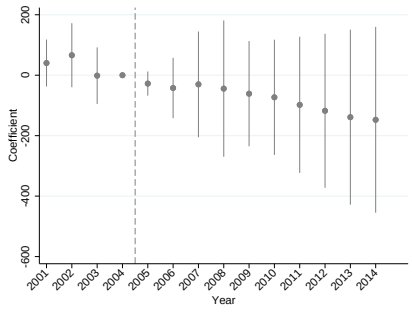
(b) Unemployment



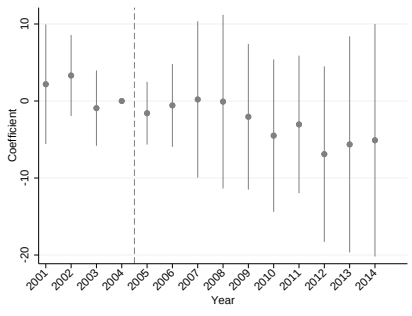
(c) P10



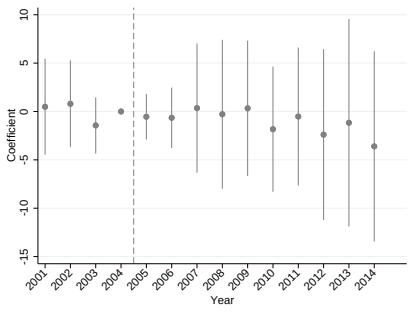
(d) P50



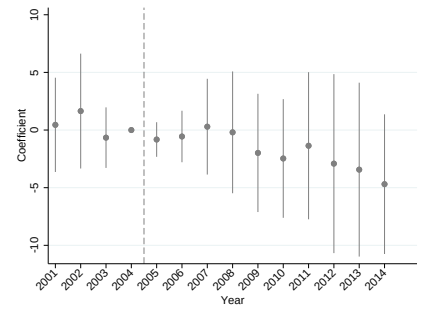
(e) Domestic Workers



(f) Firms 3+



(g) Firms 10+

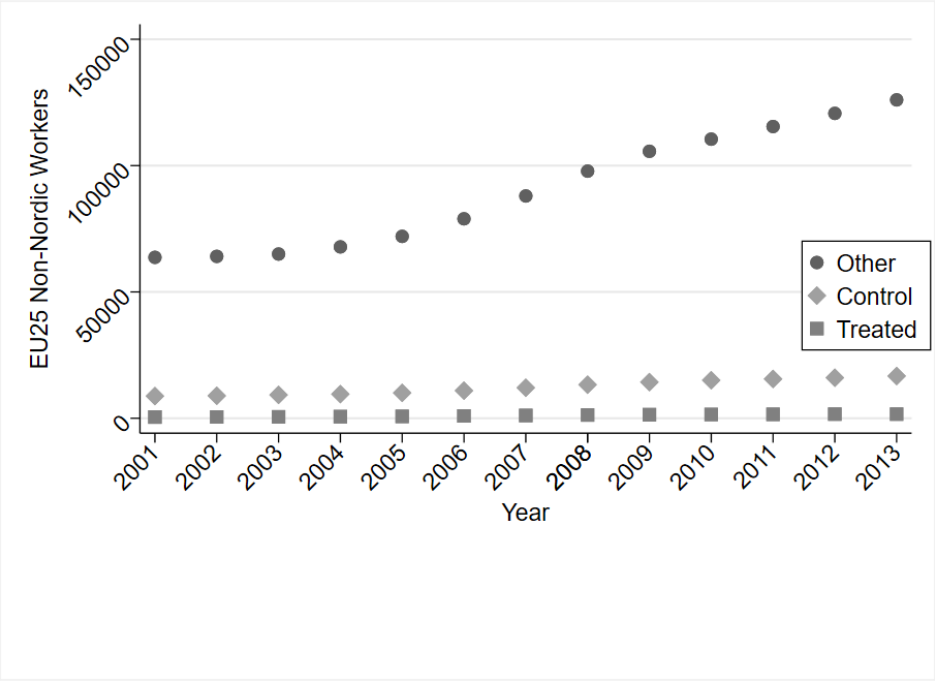


(h) Firms 20+

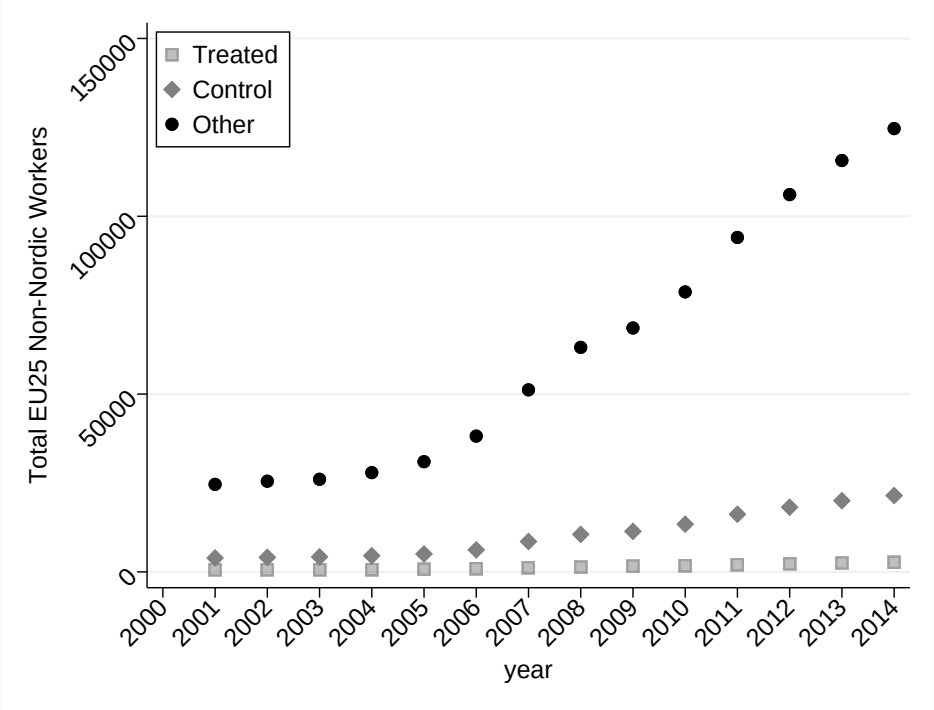
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure A7: Trends Around EU Expansion

Panel A: Sweden



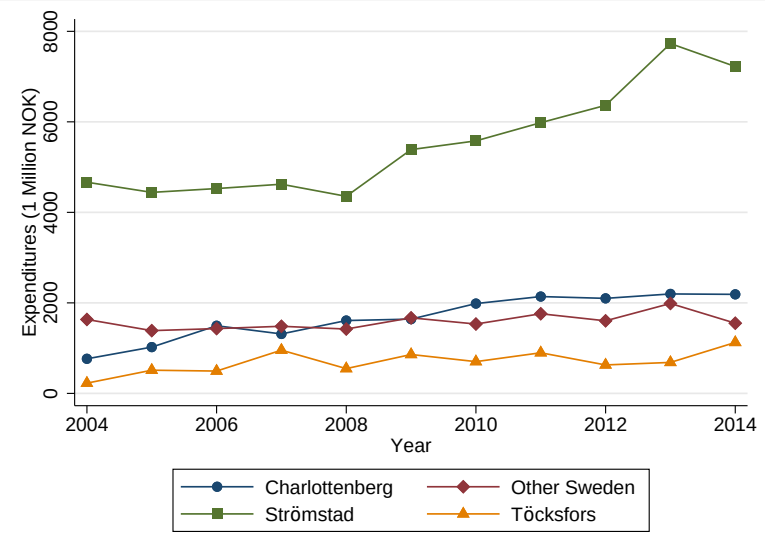
Panel B: Norway



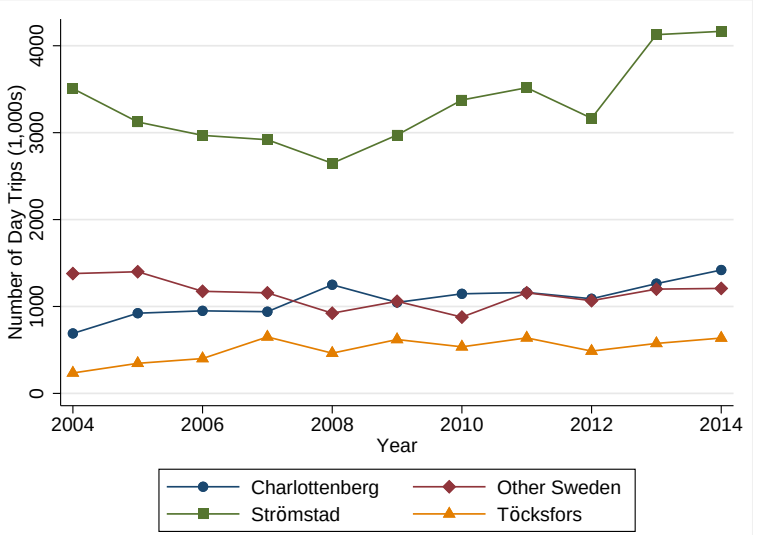
Source: Authors' calculations of Swedish and Norwegian register data.
Notes: Figure captures the number of workers born in the 25 expanded EU countries excluding the Nordics.

Figure A8: Cross-Border Trade

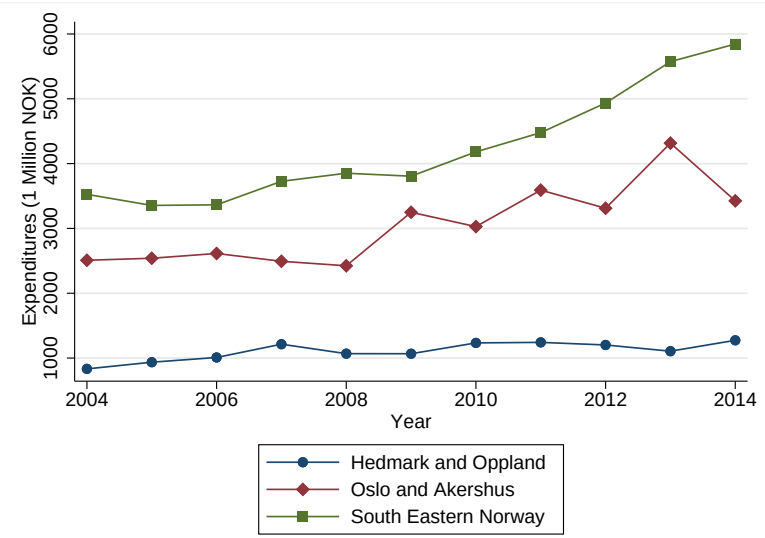
Panel A: Expenditures by Destination (Million NOK)



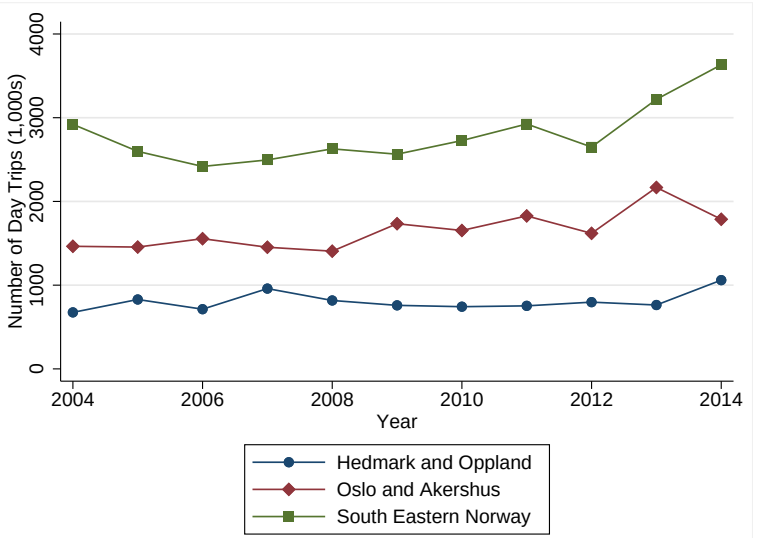
Panel B: Day Trips by Destination (1000s)



Panel C: Expenditures by Source Region (Million NOK)



Panel D: Day Trips by Source region (1000s)



Source: Statistics Norway's quarterly cross-border trade survey for trips taken without accommodations including business and leisure purposes.
Notes: Panels A and B are for specific destination municipalities on the Swedish side of the border. Panels C and D are for regions in Norway from which cross-border shoppers originate their day trips.

B Municipality-Level Robustness Tests

Table B1: Municipality Response with Wild Cluster Bootstrap SE: Sweden

Panel A: Core Labor Market

	Employment Norway (1)	Employment Sweden (2)	Employment Total (3)	Unemployment Benefits (4)	Average Earnings (5)
Phase In	0.010***	-0.008**	0.001	-0.015**	4300.8**
	(0.002)	(0.004)	(0.004)	(0.006)	(2004.1)
Full Exposure	0.033***	-0.018**	0.008	-0.021**	11499.5***
	(0.004)	(0.007)	(0.005)	(0.009)	(3477.2)
Mean	0.008	0.85	0.85	0.14	181729

Panel B: Equality

	P10 (1)	P50 (2)	P90 (3)
Phase In	236.0*	2132.4	10919.0***
	(132.2)	(1973.9)	(3307.8)
Full Exposure	364.6	6804.1**	22939.2***
	(250.1)	(3343.4)	(5634.8)
Mean	35.5	191998.2	338015.1

Panel C: Municipality Population and Business Activity

	Population (1)	Number Workers (2)	Firms 3+ (3)	Firms 5+ (4)	Firms 10+ (5)	Firms 20+ (6)
Phase In	-111.0	-17.9	-11.2**	-7.3***	-1.1	-0.80
	(80.3)	(66.8)	(4.8)	(2.7)	(1.4)	(1.0)
Full Exposure	-552.0**	-323.4*	-24.6***	-18.7***	-5.1**	-4.6***
	(224.1)	(183.3)	(8.9)	(5.6)	(2.4)	(1.3)
Mean	14628	12308	246.1	139.8	64.3	30.2

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year with wild cluster bootstrap standard errors below each coefficient.

Table B2: Municipality Response with Wild Cluster Bootstrap SE: Norway

	Employment Domestic + Commuters	Employment Domestic	Commuters/ FT Domestic Workers	Unemployment benefits Domestic	Domestic Average Wage	Employment Norwegian
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-0.005	-0.010***	0.011**	0.001	-3024.0**	-0.011***
Wild Bootstrap SE	(0.004)	(0.003)	(0.005)	(0.002)	(1197)	(0.003)
Full Exposure	-0.007	-0.021***	0.048***	0.000	-3338.0	-0.023***
Wild Bootstrap SE	(0.007)	(0.004)	(0.013)	(0.003)	(3062)	(0.003)
Mean	0.73	0.71	0.03	0.05	340878	0.72
Panel B: Equality						
	P10	P50	P90			
	(1)	(2)	(3)			
Phase In	-1,690.63	-2,833**	-6,897**			
Wild Bootstrap SE	(1,413)	(1,084)	(2,649)			
Full Exposure	351.4	-2,932	-13,301**			
Wild Bootstrap SE	(2,166)	(2,665)	(5,738)			
Mean	174533	326882	500843			
Panel C: Municipality population and business activity						
	Population	Number of FT Domestic Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	30.31	-67.4	-1.96	-0.79	-0.12	-1.01
Wild Bootstrap SE	(154.8)	(64.4)	(4.44)	(3.99)	(3.23)	(2.76)
Full Exposure	54.2	-141.3	-6.17	-2.50	-1.86	-3.33
Wild Bootstrap SE	(373)	(118.9)	(6.49)	(5.93)	(5.14)	(4.43)
Mean	10664	3800	195	146	98	71

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations: 1,316 except Panel A columns 1-3, which have 1,144 observations.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year with wild cluster bootstrap standard errors below each coefficient.

Table B3: Municipality Response: Sweden Poisson Specification for Count Variables

Municipality Population and Business Activity						
	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-0.032***	-0.032**	-0.026	-0.047	0.037	-0.045
	(0.011)	(0.013)	(0.029)	(0.031)	(0.05)	(0.082)
Full Exposure	-0.073***	-0.067***	-0.035	-0.097***	-0.003	-0.243***
	(0.021)	(0.025)	(0.038)	(0.037)	(0.048)	(0.076)

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: Estimates come from Equation 2 using a Poisson specification and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table B4: Municipality Response: Norway Poisson Specification for Count Variables

Municipality Population and Business Activity						
	Population	Number of Domestic Full-time Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	0.001	-0.018**	-0.010	-0.004	0.001	-0.015
	(0.009)	(0.008)	(0.009)	(0.011)	(0.013)	(0.017)
Full Exposure	-0.000	-0.037**	-0.031*	-0.014	-0.015	-0.046*
	(0.017)	(0.017)	(0.016)	(0.014)	(0.019)	(0.028)

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations: 1,316 for every outcome.
Notes: Estimates come from Equation 2 using a Poisson specification and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table B5: Municipality Response: Sweden with alternative controls

Panel A: All municipalities except three metropolitan cities

	Employment Norway	Employment Total	Average Earnings	P90	Population	Firms
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	0.011***	0.002	3757.7*	6882.0**	-229.2***	-10.09***
	(0.002)	(0.003)	(1924.7)	(3260.0)	(59.0)	(2.00)
Full Exposure	0.033***	0.009*	10011.7***	15744.0***	-894.1***	-23.70***
	(0.004)	(0.005)	(3351.2)	(5549.1)	(156.0)	(3.48)
Mean	0.007	0.850	184927.3	345129.1	13668.4	131.08

Panel B: All municipalities

	Employment Norway	Employment Total	Average Earnings	P90	Population	Firms
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	0.011***	0.002	3801.6**	6896.9**	-402.4***	-13.99***
	(0.002)	(0.003)	(1923.4)	(3256.0)	(138.1)	(3.54)
Full Exposure	0.033***	0.009*	10047.5***	15732.9***	-1399***	-33.30***
	(0.004)	(0.005)	(3349.1)	(5542.9)	(414.2)	(8.22)
Mean	0.007	0849	184857.4	345538.6	16554.9	158.10

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 with alternative control municipalities and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table B6: Municipality Response: Norway with alternative controls

Panel A: All municipalities except three metropolitan cities

	Employment Domestic	Commuters / FT Domestic Workers	Average Earnings Domestic	P90	Population	Firms 3+
Phase In	-0.016***	0.013***	-6623.7***	-14575.4***	-14.7	-2.258
	(0.002)	(0.004)	(955.1)	(2417.1)	(146.6)	(3.960)
Full Exposure	-0.031***	0.051***	-12100.0***	-29361.1***	-36.1	-7.635
	(0.004)	(0.013)	(2726.6)	(5229.7)	(348.2)	(5.849)
Mean	0.72	0.02	348805.3	516444.4	8986	170.68

Panel B: All Municipalities

	Employment Domestic	Commuters / FT Domestic Workers	Average Earnings Domestic	P90	Population	Firms 3+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-0.016***	0.013***	-6702.7***	-14776.5***	-156.5	-5.482
	(0.002)	(0.004)	(954.5)	(2416.6)	(175.8)	(4.417)
Full Exposure	-0.031***	0.051***	-12255.2***	-29794.5***	-415.9	-12.767*
	(0.004)	(0.013)	(2725.6)	(5229.6)	(436.1)	(6.677)
Mean	0.72	0.02	349293.7	517489.6	11298	215.03

Source: Authors' calculations of Norwegian registry data from 2001 to 2014.
Notes: Estimates come from Equation 2 with alternative control municipalities and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Table B7: Municipality Response: Sweden through Synthetic Difference-in-Differences Design

Panel A: Core Labor Market

	Employment Norway	Employment Sweden	Employment Total	Unemployment Benefits	Average Earnings
	(1)	(2)	(3)	(4)	(5)
Treated	0.033	-0.023	0.003	-0.012	10064.3
Bootstrap SE	(0.004)***	(0.006)***	(0.003)	(0.011)	(3974.8)**

Panel B: Equality

	P10	P50	P90
	(1)	(2)	(3)
Treated	-62.0	4749.9	26254.5
Bootstrap SE	(51.5)	(2684.5)*	(8409.7)***

Panel C: Municipality Population and Business Activity

	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-708.2	-347.0	-24.1	-20.7	-6.0	-4.6
Bootstrap SE	(279.3)**	(178.5)*	(9.4)**	(5.2)***	(2.2)***	(1.1)***

Source: Authors' calculations of Swedish registry data from 2001 to 2014.
Notes: Estimates correspond to the "Full Exposure" values for 2010-2014 in the synthetic difference-in-differences design in Section 6.2. Bootstrap standard errors based on 100 iterations are provided in parentheses Arkhangelsky et al. (2021).

Table B8: Municipality Response: Norway through Synthetic Difference-in-Differences Design

	Employment Domestic+ Commuters	Employment Domestic	Commuters/ FT Domestic	Unemployment Domestic	Average Earnings Domestic	Employment Norwegian
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Core Labor Market						
Treated	-0.001	-0.024	0.047	0.011	-8690.45	-0.026
Bootstrap SE	(0.008)	(0.003)***	(0.014)***	(0.004)**	(3430.05)**	(0.004)***
Panel B: Equality						
	P10	P50	P90			
	(1)	(2)	(3)			
Treated	-2695.49	-8134.94***	-27172.2***			
Bootstrap SE	(2259.51)	(2840.37)	(6914.95)			
Panel C: Municipality population and business activity						
	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	3.97	-105.92	-0.586	3.309	-0.166	-0.245
Bootstrap SE	(124.24)	(98.14)	(5.82)	(5.98)	(3.52)	(2.14)

Source: Authors' calculations of Norwegian registry data from 2001 to 2014.
Estimates correspond to the "Full Exposure" values for 2010-2014 in the synthetic difference-in-differences design in Section 6.2. Bootstrap standard errors based on 100 iterations are provided in parentheses Arkhangelsky et al. (2021).

Table B9: Municipality Response: Sweden with Shift-share Control Industry

Panel A: Core Labor Market

	Employment Norway	Employment Sweden	Employment Total	Unemployment Benefits	Average Earnings
	(1)	(2)	(3)	(4)	(5)
Phase In	0.015***	-0.009**	0.000	-0.011*	4132.6**
	(0.002)	(0.004)	(0.003)	(0.006)	(1873.0)
Full Exposure	0.033***	-0.016**	0.007	-0.015*	10448.6***
	(0.004)	(0.006)	(0.005)	(0.009)	(2866.9)

Panel B: Equality

	P10	P50	P90
	(1)	(2)	(3)
Phase In	134.9	953.6	11650.0***
	(147.5)	(2038.2)	(3102.4)
Full Exposure	309.0	5456.4*	21416.5***
	(303.7)	(3044.6)	(4672.1)

Panel C: Municipality Population and Business Activity

	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	-119.6	-82.8	-10.1**	-8.8***	-2.5	-1.0
	(86.8)	(77.1)	(4.7)	(3.2)	(1.7)	(1.0)
Full Exposure	-515.0**	-344.0*	-21.6***	-18.1***	-5.0**	-4.5***
	(202.3)	(175.6)	(7.7)	(4.8)	(2.4)	(1.1)

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: The industry Bartik control is constructed by interacting the total change in national employment between 2004 to 2014 in each 2-digit industry (the shift) with 2004 baseline shares of municipality employment in each 2-digit industry (the share). This predicts expected exposure to any industry-specific shocks between 2004 and 2014 for each municipality.

Table B10: Municipality Response: Norway with Shift-share Control Industry

Panel A: Core Labor Market					
	Employment Domestic+ Commuters	Employment Domestic	Commuters/ FT Domestic	Unemployment Domestic	Average Earnings Domestic
	(1)	(2)	(3)	(4)	(5)
Phase In	-0.005	-0.010***	0.011**	0.001	-2777**
	(0.004)	(0.003)	(0.005)	(0.002)	(1152)
Full Exposure	-0.007	-0.021***	0.048***	0.0005	-2761
	(0.007)	(0.004)	(0.013)	(0.003)	(2697)
Mean	0.73	0.71	0.03	0.05	340878
Panel B: Equality					
	P10	P50	P90		
	(1)	(2)	(3)		
Phase In	-1663	-2740***	-6173**		
	(1376)	(1031)	(2512)		
Full Exposure	414.9	-2715	-11614**		
	(2086)	(2525)	(5049)		
Mean	174533	326882	500843		
Panel C: Municipality population and business activity					
	Population	Number Workers	Firms 3+	Firms 5+	Firms 10+	Firms 20+
	(1)	(2)	(3)	(4)	(5)	(6)
Phase In	55.06	-54.77	-1.297	-0.200	0.403	-0.519
	(147.4)	(58.71)	(4.030)	(3.666)	(2.963)	(2.512)
Full Exposure	111.9	-111.9	-4.642	-1.132	-0.643	-2.179
	(355.2)	(111.7)	(6.070)	(5.412)	(4.705)	(4.092)
Mean	10664	3800	195	146	98	71

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations: 1,316 except Panel A columns 1-2, which have 1,144 observations.
Notes: The industry Bartik control is constructed by interacting the total change in national employment between 2004 to 2014 in each 2-digit industry (the shift) with 2004 baseline shares of municipality employment in each 2-digit industry (the share). This predicts expected exposure to any industry-specific shocks between 2004 and 2014 for each municipality.

Table B11: Municipality Response: Sweden with Shift-share EU Expansion Control

Panel A: Core Labor Market

	Employment Norway (1)	Employment Sweden (2)	Employment Total (3)	Unemployment Benefits (4)	Average Earnings (5)
Phase In	0.016***	-0.011***	0.001	-0.017**	4716.2**
	(0.002)	(0.004)	(0.003)	(0.006)	(2057.3)
Full Exposure	0.034***	-0.018**	0.008	-0.028***	10436.4***
	(0.004)	(0.007)	(0.005)	(0.009)	(3165.5)

Panel B: Equality

	P10 (1)	P50 (2)	P90 (3)
Phase In	194.0*	1728.5	12189.4***
	(109.9)	(2021.1)	(3444.9)
Full Exposure	449.6	5783.8*	21058.0***
	(315.6)	(3125.5)	(5048.6)

Panel C: Municipality Population and Business Activity

	Population (1)	Number Workers (2)	Firms 3+ (3)	Firms 5+ (4)	Firms 10+ (5)	Firms 20+ (6)
Phase In	-214.488**	-132.0	-13.9**	-10.5***	-3.6*	-1.1
	(103.2)	(82.8)	(5.6)	(3.6)	(1.8)	(1.0)
Full Exposure	-764.4***	-514.6**	-30.2***	-23.2***	-7.7**	-5.4***
	(290.2)	(231.5)	(11.0)	(7.5)	(3.0)	(1.6)

Source: Authors' calculations of Swedish registry data from 2001 to 2014. Observations: 967 for every outcome.
Notes: The EU expansion Bartik control is constructed by interacting the total change in the number of workers between 2004 and 2014 that were born in the 25 expanded EU states excluding the Nordic countries (the shift) with 2004 baseline shares of municipality employment from each of the 25 expanded EU states (the share). This predicts expected exposure to EU migration from expansion between 2004 and 2014 for each municipality.

Table B12: Municipality Response: Norway with Shift-share EU Expansion Control

Panel A: Core Labor Market

	Employment Domestic+ Commuters (1)	Employment Domestic (2)	Commuters/ FT Domestic (3)	Unemployment Domestic (4)	Average Earnings Domestic (5)
Phase In	-0.00	-0.011***	0.010**	0.001	-3010**
	(0.004)	(0.003)	(0.004)	(0.002)	(1151)
Full Exposure	-0.009	-0.023***	0.046***	0.001	-3287
	(0.007)	(0.005)	(0.013)	(0.003)	(2962)
Mean	0.73	0.71	0.03	0.05	340878

Panel B: Equality

	P10 (1)	P50 (2)	P90 (3)
Phase In	-1720	-2780**	-6641**
	(1412)	(1081)	(2593)
Full Exposure	244.6	-2741	-12374**
	(2179)	(2601)	(5544)
Mean	174533	326882	500843

Panel C: Municipality population and business activity

	Population (1)	Number Workers (2)	Firms 3+ (3)	Firms 5+ (4)	Firms 10+ (5)	Firms 20+ (6)
Phase In	62.06	-55.47	-1.459	-0.408	0.272	-0.701
	(147.3)	(60.75)	(4.328)	(3.905)	(3.133)	(2.664)
Full Exposure	169.1	-98.19	-4.379	-1.127	-0.441	-2.202
	(343.0)	(106.8)	(6.122)	(5.679)	(4.821)	(4.135)
Mean	10664	3800	195	146	98	71

Source: Authors' calculations of Norwegian registry data from 2001 to 2014. Observations: 1,316 except Panel A columns 1-2, which have 1,144 observations.

Notes: The EU expansion Bartik control is constructed by interacting the total change in the number of workers between 2004 and 2014 that were born in the 10 EU expansion states of Eastern and Southern Europe (the shift) with 2004 baseline shares of municipality employment from each of the 10 expansion states (the share). This predicts expected exposure to EU migration from expansion between 2004 and 2014 for each municipality.

Table B13: Municipality Response: Sweden and Norway with Demographic and Skill Controls

Panel A: Sweden

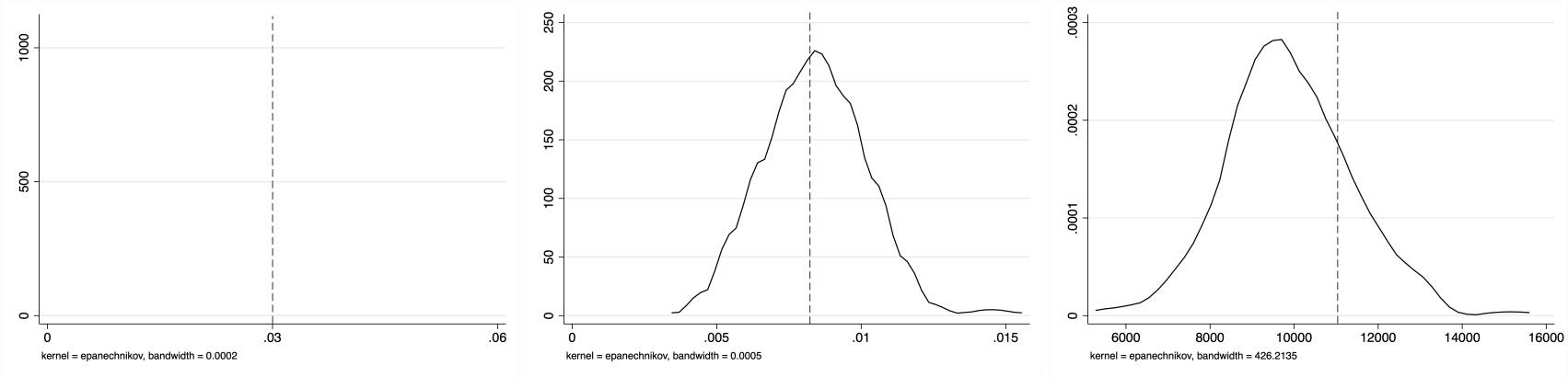
	Employment Norway (1)	Employment Sweden (2)	Employment Total (3)	Unemployment Benefits (4)	Average Earnings (5)
Phase In	0.010***	-0.008**	0.000	-0.011**	4630**
	(0.002)	(0.004)	(0.003)	(0.005)	(2053)
Full Exposure	0.033***	-0.018**	0.007	-0.018**	12088***
	(0.004)	(0.007)	(0.005)	(0.009)	(3191)
Mean	0.008	0.85	0.85	0.14	181729

Panel B: Norway

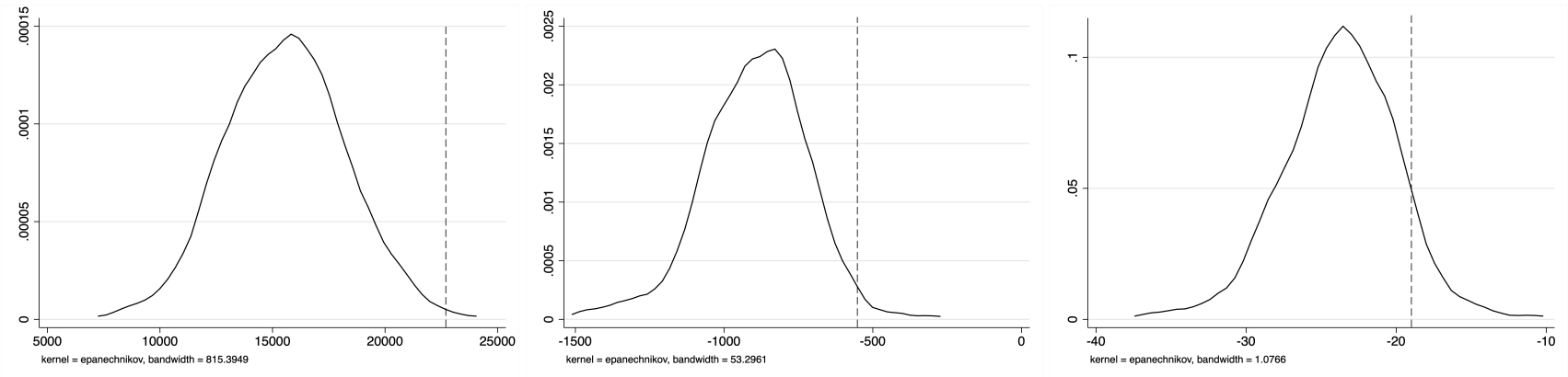
	Employment Domestic+ Commuters (1)	Employment Domestic (2)	Commuters/ FT Domestic (3)	Unemployment Domestic (4)	Average Earnings Domestic (5)
Phase In	-0.006	-0.010***	0.009**	-0.0001	-1445
	(0.005)	(0.003)	(0.004)	(0.002)	(1098)
Full Exposure	-0.012*	-0.022***	0.044***	0.0003	-1998
	(0.007)	(0.005)	(0.011)	(0.003)	(2548)
Mean	0.73	0.71	0.03	0.05	340878

Source: Authors' calculations of Swedish and Norwegian registry data from 2001 to 2014. Observations: 967 for Sweden and 1,316 for Norway. Notes: Estimates come from Equation 2 with the inclusion of controls for education bins, female share of workers, age bins, the share married, share single, and the share of adults with children at home.

Figure B1: Sweden - Municipalities, Random Control Permutations



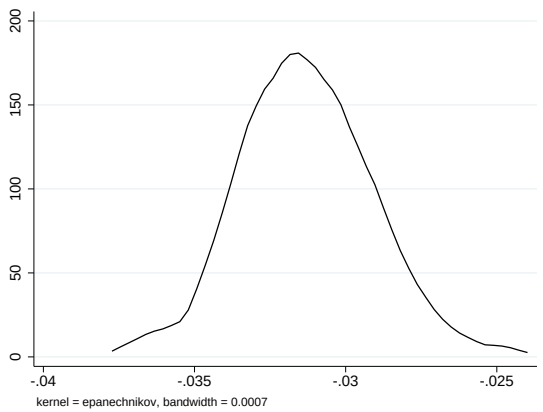
(a) Employment Norway (b) Employment Total (c) Average Earnings



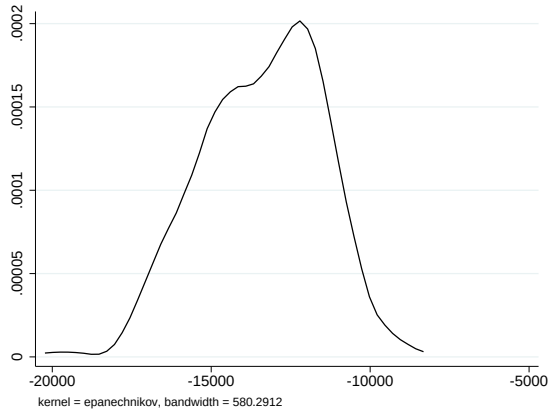
(d) P90 (e) Population (f) Firms 5+

Source: Authors' calculations of Swedish register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2 when randomly generating control assignment for each of the non-border municipalities in our baseline specification. Vertical lines represent our baseline estimates. In Panel (a), all permutations return results between 0.0301 and 0.0303; identical to the base specification of 0.03. We therefore plot this as a point distribution.

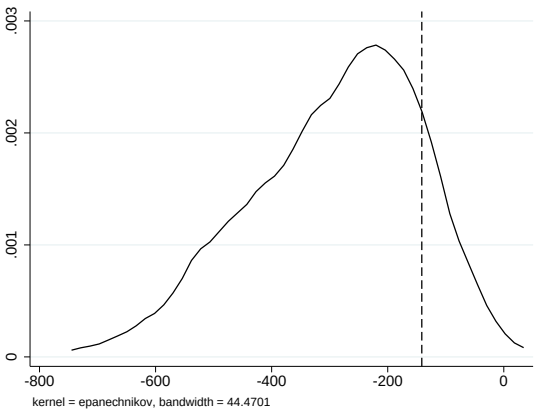
Figure B2: Norway - Municipalities, Random Control Permutations



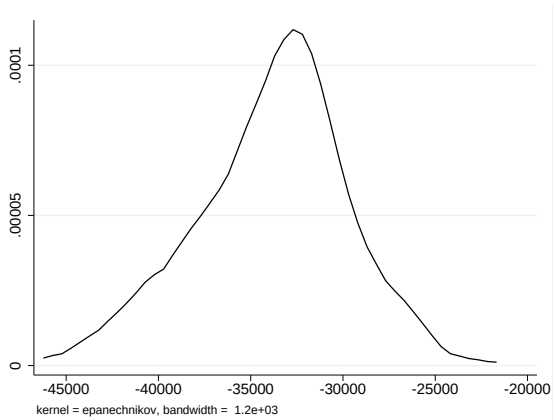
(a) Pr(Employed)



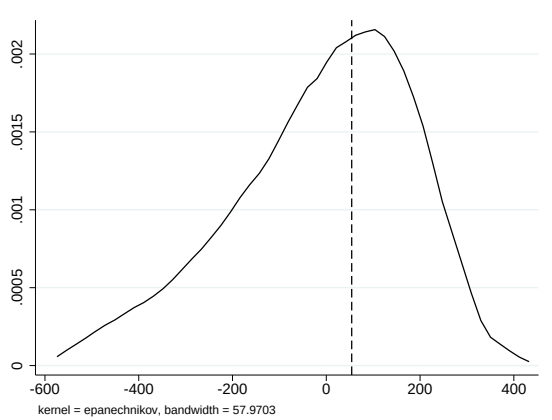
(b) Average Earnings



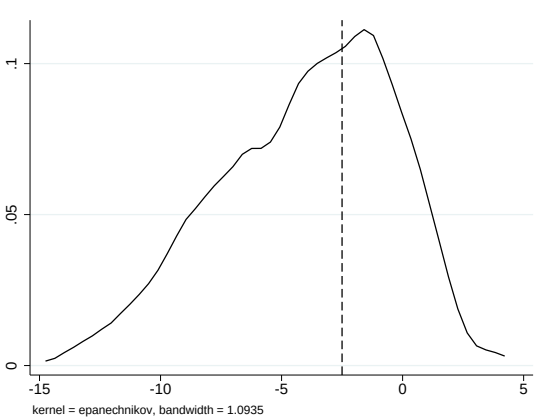
(c) Domestic Workers



(d) P90



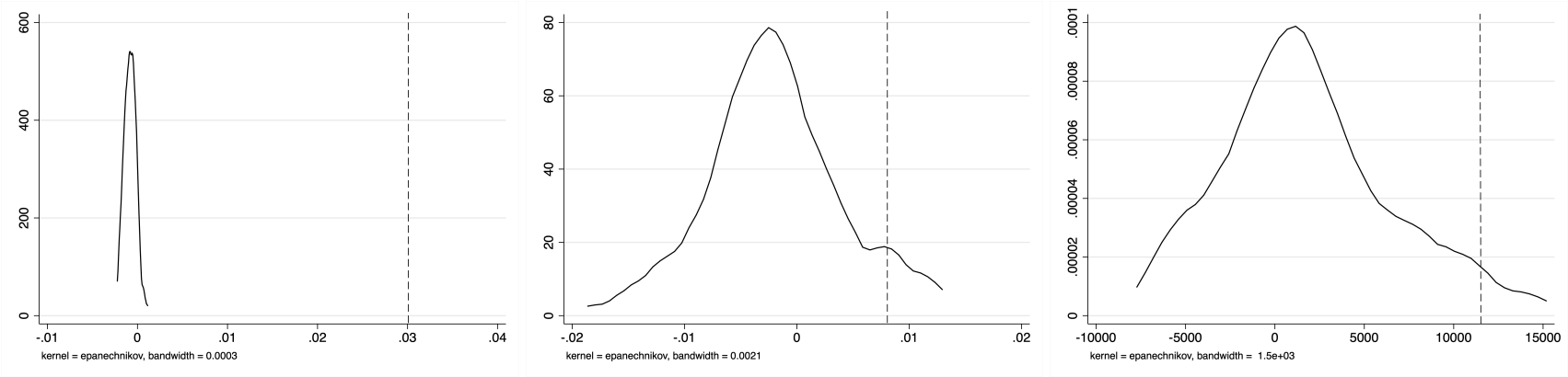
(e) Population



(f) Firms 5+

Source: Authors' calculations of Norwegian register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2 when randomly generating control assignment for each of the non-border municipalities in our baseline specification. Vertical lines represent our baseline estimates.

Figure B3: Sweden - Municipalities, Placebo Estimates

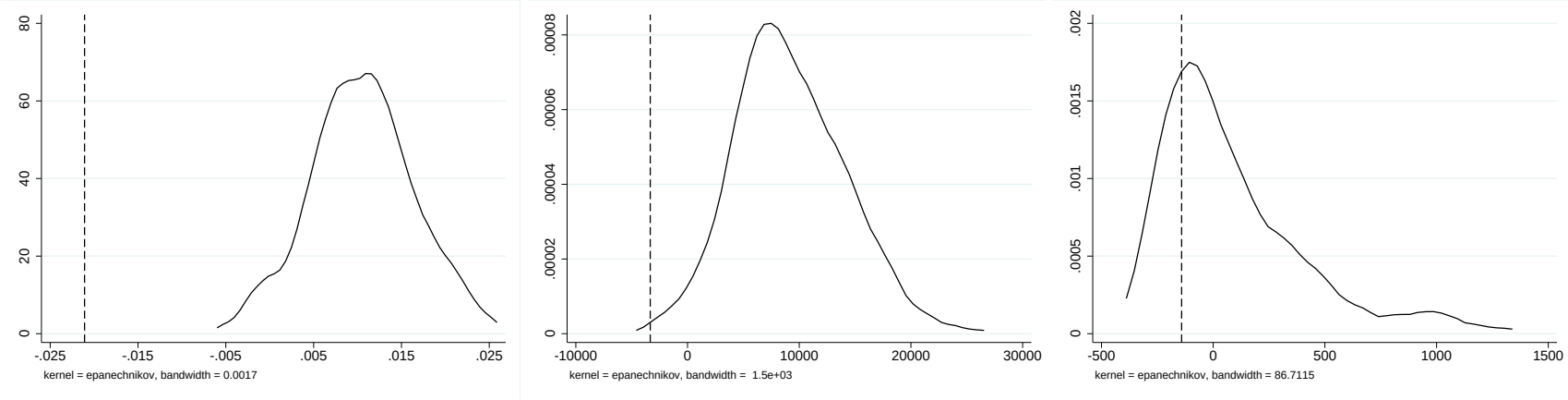


(a) Employment Norway (b) Employment Total (c) Average Earnings

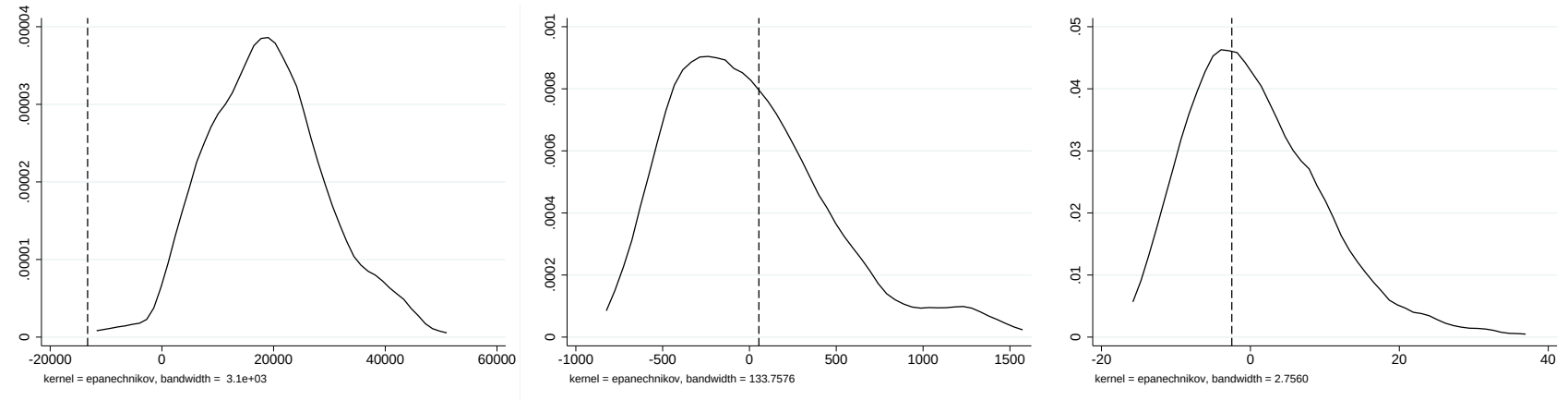
(d) P90 (e) Population (f) Firms 5+

Source: Authors' calculations of Swedish register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2 when randomly generating treatment assignment for each of the municipalities not originally designated as treated in our baseline specification. Vertical lines represent our baseline estimates.

Figure B4: Norway - Municipalities, Placebo Estimates



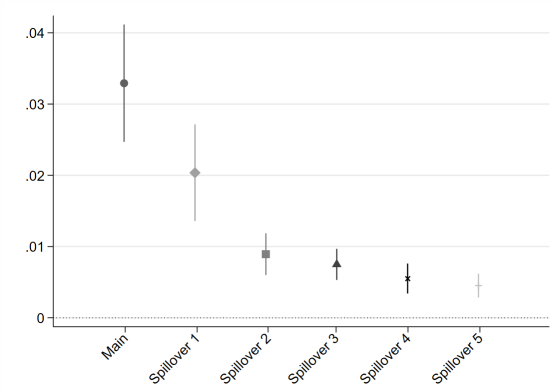
(a) Pr(Employed) (b) Average Earnings (c) Domestic Workers



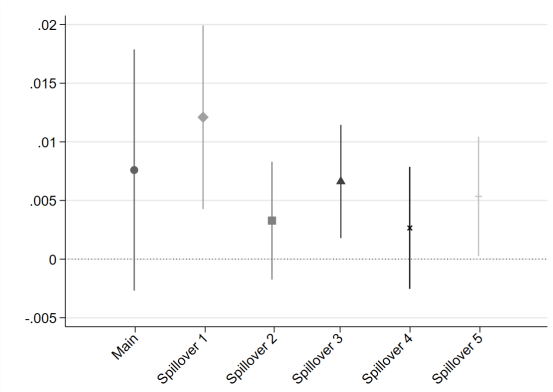
(d) P90 (e) Population (f) Firms 5+

Source: Authors' calculations of Norwegian register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2 when randomly generating treatment assignment for each of the municipalities not originally designated as treated in our baseline specification. Vertical lines represent our baseline estimates.

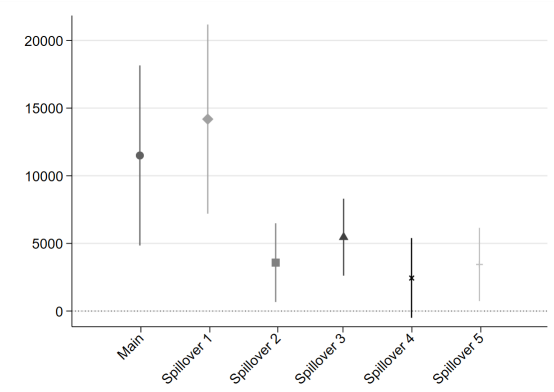
Figure B5: Sweden - Municipalities, Alternative Treatment Groups



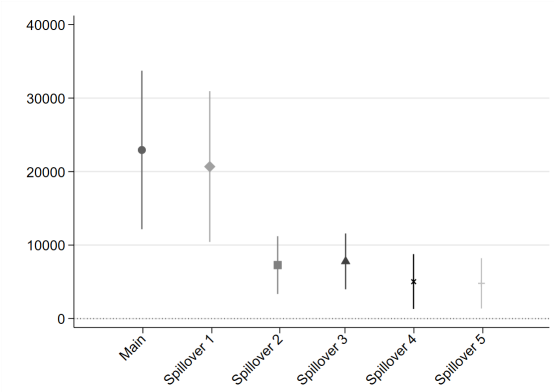
(a) Employment Norway



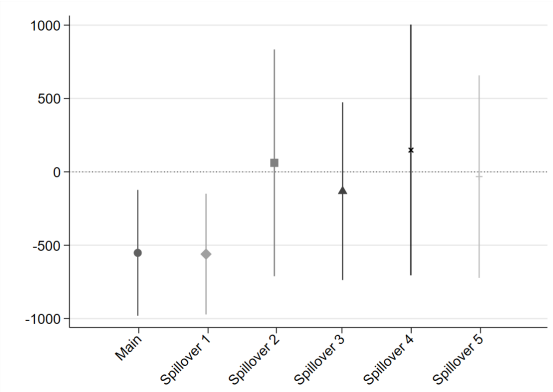
(b) Employment Total



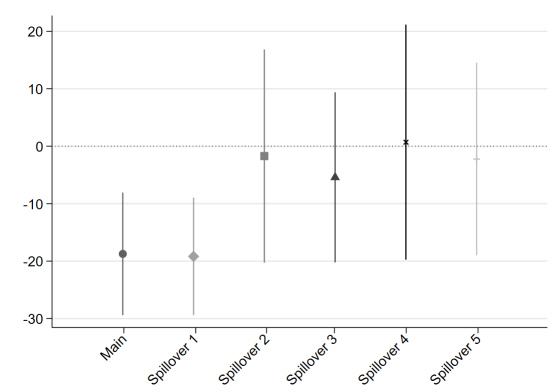
(c) Average Earnings



(d) P90



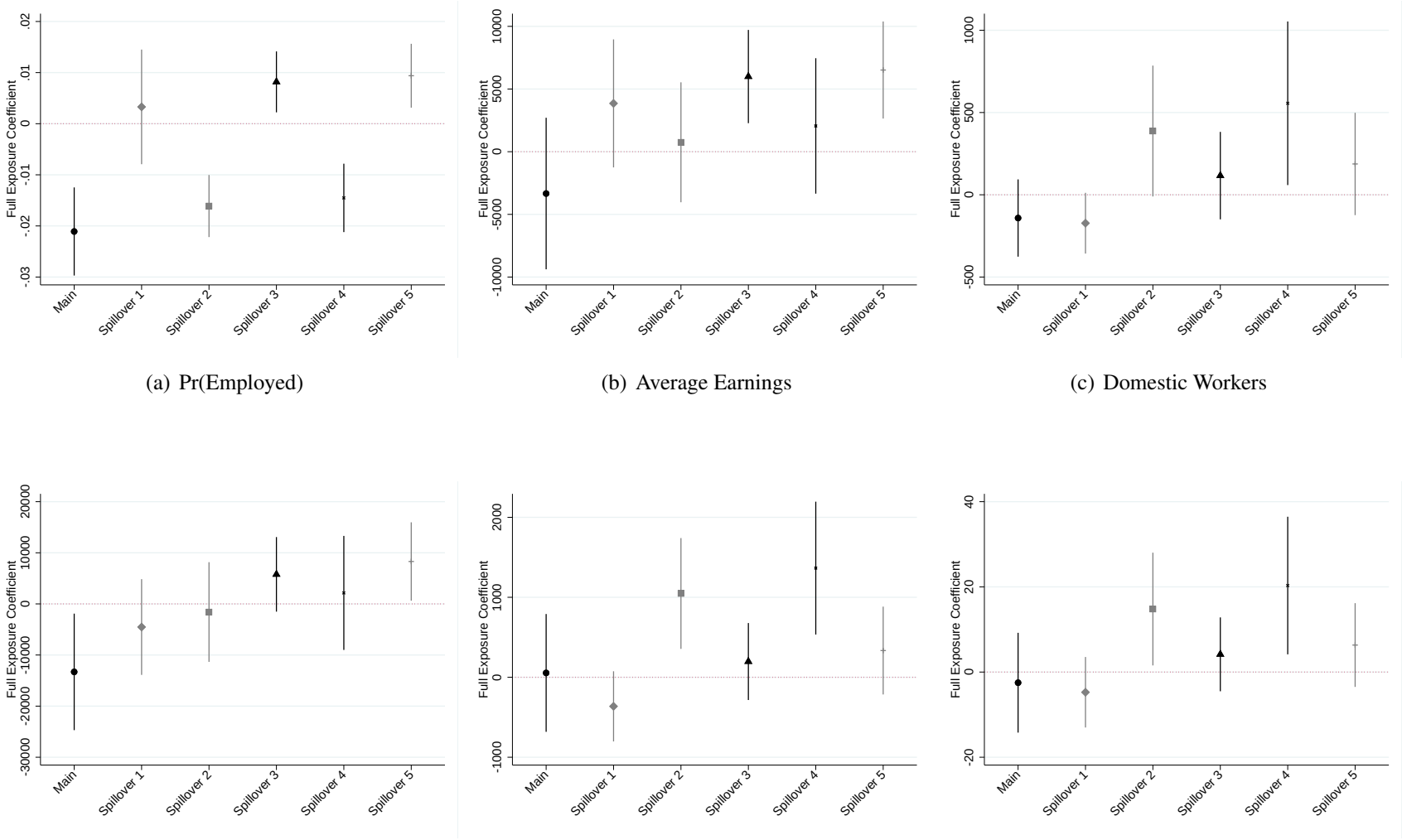
(e) Population



(f) Firms 5+

Source: Authors' calculations of Swedish register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level. We first show the main estimate, the expanded treatment group to include all border municipalities (including those in the sparse northern area) in spillover 1, then all municipalities in the counties that our main treatment municipalities are located in (including those municipalities in the counties that are not on the border) in spillover 2, all municipalities in all border counties (including those in the north) in spillover 3, all municipalities in the counties that our main treatment municipalities are located in except our main treatment municipalities in spillover 4, and all municipalities in all border counties except those that are at the border in spillover 5.

Figure B6: Norway - Municipalities, Alternative Treatment Groups



(a) Pr(Employed) (b) Average Earnings (c) Domestic Workers

(d) P90 (e) Population (f) Firms 5+

Source: Authors' calculations of Norwegian register data.
Notes: Coefficients are for the "Full Exposure" values from Equation 2. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level. We first show the main estimate, the expanded treatment group to include all border municipalities (including those in the sparse northern area) in spillover 1, then all municipalities in the counties that our main treatment municipalities are located in (including those municipalities in the counties that are not on the border) in spillover 2, all municipalities in all border counties (including those in the north) in spillover 3, all municipalities in the counties that our main treatment municipalities are located in except our main treatment municipalities in spillover 4, and all municipalities in all border counties except those that are at the border in spillover 5.

C Detailed Conceptual Framework

Labor market competition is generally considered desirable from the perspective of workers: stronger outside options raise wages and limit firms' ability to pay workers less than their marginal revenue products. This perspective, however, captures only part of the adjustment process. Changes in workers' outside options do not affect workers alone. They also alter firm behavior. Because firms determine local labor demand, production, and business activity, these responses propagate the effects of labor market competition throughout the local economy. As a result, the ultimate consequences of increased labor market competition depend not only on how workers respond, but also on how firms adjust.

To organize the mechanisms underlying our empirical analysis, we present a simple partial-equilibrium framework of wage setting under imperfect competition, in the spirit of Manning (2003a) and Card (2022). The framework isolates how improvements in workers' outside options affect firm behavior and, through firms, local communities. Throughout, we consider a single local labor market on each side of the border, holding goods demand and all other markets fixed.

Wage Setting at the Firm

Consider a firm in a Swedish border community that produces output $F(L)$ using labor L, with $F' > 0$ and $F'' < 0$. Output sells at a fixed price, and the firm incurs a fixed operating cost $k > 0$. The firm will operate only if $\pi = F(L) - wL - k \geq 0$, that is, when it is profitable to do so given its fixed costs of operation.

Let b denote the value of workers' outside option—here, the wage available in Norway net of commuting costs. The firm has some level of wage-setting power and faces an upward-sloping labor supply curve $L(w, b)$ with $\partial L/\partial w > 0$ and $\partial L/\partial b < 0$, and wage elasticity $\varepsilon(w, b) \equiv \frac{\partial \ln L}{\partial \ln w} > 0$. The elasticity ε captures the degree of labor market competition, with $\varepsilon \to \infty$ corresponding to perfect competition. When $\varepsilon < \infty$, the firm has wage-setting power and selects w to maximize $\pi = F\big(L(w,b)\big) - w\,L(w,b) - k$, giving the first-order condition:

$$F'(L) \;=\; w\left(1 + \frac{1}{\varepsilon(w,b)}\right) \quad\Longleftrightarrow\quad \frac{F'(L) - w}{w} \;=\; \frac{1}{\varepsilon(w,b)}. \tag{3}$$

The first-order condition implies a wage markdown below marginal revenue product that shrinks as the labor market becomes more competitive. Equation (3) has two important implications. First, the monopsony wage and employment lie below their competitive counterparts ($w^m < w^c$, $L^m < L^c$). Second, wage markdowns generate quasi-rents that allow relatively low-productivity firms to cover their fixed operating costs. Under perfect competition, these firms would be unable to survive.

For monopsonistic firms, what matters for survival is how the markdown enters profits:

$$\pi \;=\; \underbrace{\big[F(L) - F'(L)\,L\big]}_{\text{inframarginal surplus}} \;+\; \underbrace{\big[F'(L) - w\big]L}_{\text{markdown rents}} \;-\; k. \tag{4}$$

In a perfectly competitive labor market, markdown rents are zero, and survival is purely about the firm's productivity: only firms whose surplus covers k will remain in the market. With wage-setting power, firms whose surplus falls short of k but whose markdown rents make up the difference remain viable. Their existence is financed by paying workers less than marginal product.

An Improvement in Outside Options: the Swedish Side

The Norwegian boom increases the value of workers' outside option, b. This shifts the firm's labor supply through a *level* effect (fewer workers will want to work locally rather than commute) and an *elasticity* effect (quits become more responsive to the wage when the alternative improves). These mechanisms arise regardless of whether wages are determined through wage posting or bargaining. Under bargaining, improved outside options simply increase workers' disagreement payoffs, generating the same qualitative predictions.

As a result, profits fall:

$$\frac{d\pi}{db} = \left(F'(L) - w\right)\frac{\partial L}{\partial b} < 0, \tag{5}$$

How much a Swedish firm can adjust to Norwegian wage competition depends on where the new outside option, w^N, lies relative to local wages, as illustrated in Panel (a) of Figure C7. Workers will no longer accept local employment paying less than the net wage available through commuting to Norway, so w^N becomes the minimum wage required to retain workers. If $w^m < w^N \leq w^c$, firms can absorb the shock by compressing markdowns and raising wages while continuing to operate.

If the Norwegian outside option exceeds the local competitive wage, firms can no longer absorb the shock solely through lower markdowns. Employment is determined by labor demand at the new wage, where $F'(L) = w^N$. Firm survival then requires

$$\max_L \left\{F(L) - w^N L\right\} \geq k. \tag{6}$$

Firms that cannot satisfy this condition exit the market, taking their worker-firm matches with them.

The negative effect of the new outside option on profit is exacerbated by possible selection of who takes advantage of the outside option. If there is positive selection in commuting (i.e., more productive workers are more likely to commute because returns scale with their productivity), surviving Swedish firms retain a workforce with lower average productivity while simultaneously raising wages relative to that productivity to retain the remaining workers. Measured value added per worker falls even as average pay remains stable or increases, implying that quality-adjusted wages rise by more than observed wages. Both mechanisms compress measured markdowns and further reduce firm profitability, reinforcing the exit margin arising from lower profit in Equation (5).

This simple framework, therefore, predicts higher effective wages relative to remaining workers' productivity, compressed markdowns in the case of wage-setting firms, and elevated firm exit.[36] If instead the outside option remains below the competitive wage, firms should be able to absorb the shock by forgoing markdown rents while expanding employment toward the competitive equilibrium. The empirical analysis that follows distinguishes between these competing predictions.

The Receiving Side: Norway

For Norwegian border firms, the increase in in-commuters represents an outward shift in labor supply. Commuters' reservation wages are anchored to Swedish conditions plus commuting costs and, therefore, likely lie below those of comparable domestic (Norwegian resident) workers. As

[36] In this framework, for employment to fall below the initial monopsony level, w^N must exceed the initial marginal product, $F'(L^m) > w^c$.

a result, commuters are willing to accept employment at wages slightly below those required to recruit otherwise similar Norwegian workers.

Writing labor supply as $L(w, s)$, where s denotes the commuter inflow, with $\partial L/\partial s > 0$, gives

$$\frac{d\pi}{ds} = \big(F'(L) - w\big)\frac{\partial L}{\partial s} > 0. \tag{7}$$

For Norwegian border firms, the same shock is an outward shift in labor supply, illustrated in Panel (b) of Figure C7. Commuters' reservation wages are anchored to Swedish conditions plus commuting costs, so they accept wages slightly below prevailing Norwegian wages. Writing supply as $L(w, s)$ with s the commuter inflow, the mirror image of equation (5) gives $d\pi/ds = \big(F'(L) - w\big)\,\partial L/\partial s > 0$: a rent windfall. Firms lower domestic Norwegian wages relative to their output, substitute cheaper commuters for domestic workers, and capture the surplus—output and total employment are roughly unchanged, the wage bill falls, and the measured markdown *widens*. Because the shock strengthens profits, there is no exit margin. And because commuters likely are positively selected, competition is fiercest for high-productivity domestic workers, so displacement and wage declines concentrate at the top of the distribution.

From Firms to Communities

Community outcomes reflect the aggregation of these firm-level responses. The implications for communities depend on which equilibrium emerges. If firms respond primarily by absorbing lower markdowns, broader community effects may be limited. If instead the outside option exceeds the local competitive wage, inducing firms to contract and exit, these firm-level adjustments naturally propagate to the community level.

In this latter case, workers who are able to take advantage of the improved outside option benefit through higher earnings, while workers whose local matches are destroyed and for whom commuting is unattractive (because of low productivity or high commuting costs) may relocate within Sweden or experience weaker labor market attachment. Because the largest earnings gains accrue to commuters and workers whose outside options improve the most, local inequality is expected to rise.

Firm exit and out-migration may, in turn, reduce the local tax base and weaken local economic activity. These distributional and economic changes may also reshape political preferences. More tenuous local economic conditions might increase support for parties emphasizing worker protection and redistribution where losses fall primarily on firms and left-behind workers (Sweden), and for anti-integration parties where competition arrives through cross-border workers (Norway).

The central implication of the framework is that labor market competition is not simply a worker-level phenomenon. By changing firms' wage-setting incentives, profitability, and survival, improvements in workers' outside options propagate through firms before ultimately reshaping local communities. The remainder of the paper evaluates each stage of this transmission mechanism.

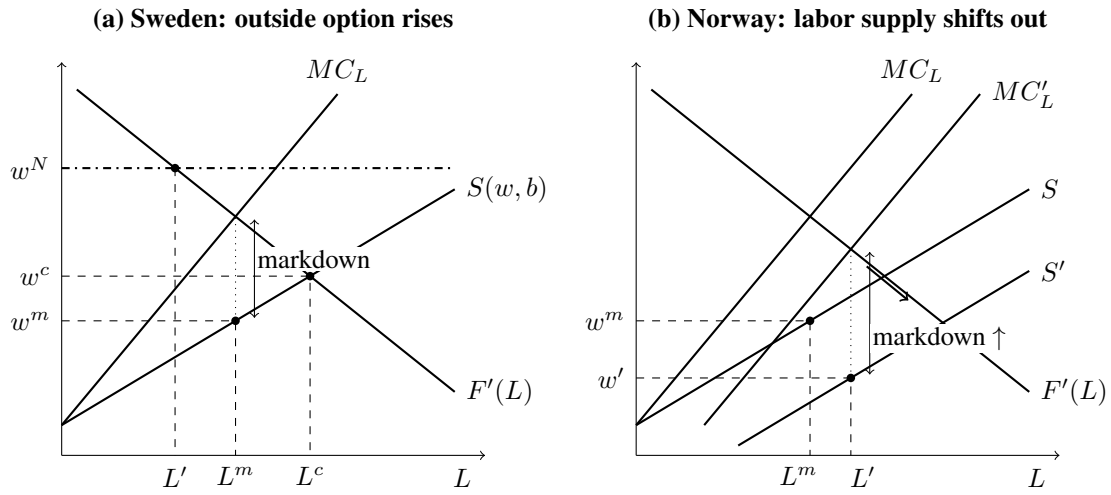


Figure C7: **Monopsonistic labor markets on both sides of the border.** Panel (a): a Swedish firm pays $w^m < w^c$ at L^m. The Norwegian boom offers a new effective commuting wage $w^N > w^c$, so labor supply becomes flat at w^N and employment is determined by labor demand at $L' < L^m$: wages for a given level of productivity rise, employment falls, the markdown goes to zero, and firms whose fixed costs were covered by markdowns exit. Had w^N fallen in $(w^m, w^c]$, employment would have *risen*. Panel (b): for Norwegian firms, commuters with lower reservation wages shift supply out ($S \rightarrow S'$); the firm lowers wages, substitutes commuters for domestic workers, and widens its markdown.