Labor Market Competition and Its Effect on Firms and Local Communities

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Abstract

We isolate the consequences of increased labor market competition on the entire ecosystem of local communities using unique features of the Scandinavian labor market. 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 individual-level register data linked across the two countries, we show that Swedish firms respond by raising worker wages relative to productivity and reducing their workforces. A compositional change in the workforce results in a drop in the average quality of workers, generating a decline in firm value added and a higher risk of firm exit. The negative effects on firms spill over to the local communities, which experience population flight, declining business activity, increased inequality, and changing political sentiments. These effects persist for at least a decade after the initial shock. We conclude that changes to workers' outside options can have a dramatic and persistent effect on local communities and send ripples across all segments of society, even in countries with automatic stabilizers specifically designed to blunt the impact of local shocks.

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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. In addition, 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.

In theory, competitive labor markets create more jobs, higher quality jobs, and induce higher wages. However, if local firms are unable to respond to new competition, the same positive shock for workers may have a detrimental effect on firms' ability to retain and recruit employees. Specifically, competition raises the value of outside options. Domestic firms will have to raise workers' wages relative to their productivity to retain workers, but the higher wages will also force firms to reduce their workforce. The wage and personnel effects of increased competition will likely require firms to re-optimize their chosen bundle of production inputs, with potential implications on productivity and value-added. Some firms may not have the capacity to absorb such cost increases and may be forced to exit the market altogether. These effects on firms will likely have important snowball effects on local community development. In particular, local businesses serve a crucial role in activating and bringing the local community together. Because increased labor competition may put local firms out of business, residents may choose to relocate to other areas of the country. Communities may also experience inequality effects across the earnings distribution depending on which workers firms compete over; local tax revenues may be affected through population changes; and there may be changes in the residents' political sentiments. The size and direction of effects on firms and communities are theoretically ambiguous and fundamentally an empirical question, one that has not been comprehensively approached before.

This paper provides novel evidence of the consequences of labor market competition for the entire ecosystem of local communities. We use unique features of the Scandinavian labor market to comprehensively examine the effects of labor competition on all segments of society. Given current trends, it is crucial to understand the effects that such competition has on not only workers but also on firms and communities. The policy stakes for understanding these effects are heightened by the fact that national competition authorities are pushing for increased labor market competition across regions and are setting up specialized commissions tasked with injecting competition into local labor markets.[1]

To perform our analysis, we exploit a shock to labor mobility from Sweden to Norway driven

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

by an economic boom in Norway between 2005 and 2009.[2] The economic boom generated a shortage of labor in Norway and a dramatic increase in the within-occupation wage differential between Norway and Sweden. By improving the labor market opportunities and outside options of Swedes, this phenomenon can be viewed as a shock to the Swedish firms' competition over labor. Importantly, only Swedish communities close to the Norwegian border were affected by the improved labor market climate in Norway; other communities were too far from the border to be impacted by it. The locally-isolated labor shock allows us to use a conventional difference-in-differences framework to identify causal effects.[3] Finally, because of extremely rich data, we can track Swedes across both sides of the border and observe their labor market outcomes in both countries. We, therefore, have a close-to-ideal setting to examine the consequences of increased labor market competition across countries that have very similar institutional structures 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 where automatic stabilizers are designed to blunt the impact of local economic shocks. The change in outside options for Swedes on the border to Norway leads them to commute to Norway while still living in Sweden. Although Swedish firms respond to the increased competition by raising worker wages relative to their productivity, they also experience declining workforces and a general reduction in the quality of the workers that they are able to recruit. As a consequence, local firms experience a drop in profits and an increased risk of going out of business. The declining local business activity combined with the increased returns to working in Norway for certain workers results in greater income inequality and changing political sentiments in the affected communities. A sizable share of the population subsequently moves away from these areas. These effects persist for at least a decade after the initial shock.

The results showcase the vulnerability of local communities to relatively modest shocks that can occur for a range of different reasons, such as the construction of transportation links across communities, the establishment of new businesses in specific regions, and changes in competition policies or migration policies. While prior work has looked at the effect of outside options on workers (e.g., Schubert et al. (2020); Caldwell and Danieli (2022)) and the effect of wage legislation on firms (e.g., Harasztosi and Lindner (2019)), no paper has isolated the effect of increased competition on workers, firms, and society through the use of an exogenous shock to the workers' outside option. More generally, prior research has not been able to provide a unified framework for understanding the interconnectedness and fragility of the community's ecosystem when one specific aspect of it (outside options of workers) is being pushed out of its prior equilibrium. This finding has major policy implications for the design of effective community stabilization poli-

[2] While Norway followed the economic performance of Sweden and the OECD until 2005, it dramatically outperformed the rest of the world during these four years.

[3] We also show that a synthetic control approach generates the same results.

cies and the decision of when to intervene in response to local economic shocks. For example, our results suggest that caution is warranted regarding policies attempting to increase community well-being through increased spatial competition for workers. Automatic local transfer systems such as those in Sweden do not appear sufficient to prevent the negative effects of labor shocks on communities if the negative effects arrive through the channel of decreasing firm persistence and lower firm productivity.

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 following the shock in 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 in 2009. While there is some heterogeneity in terms of which workers respond, the increased opportunities on the Norwegian side were relevant to Swedes living on the border across all major industries.

Second, we use detailed matched employer-employee data to analyze firm responses on the Swedish side. We show that Swedish firms respond to the increased competition by raising wages relative to productivity and lowering their wage markdowns to keep their workers and secure future hiring. Despite, or perhaps because of, the higher wages relative to productivity, Swedish firms experience significant reductions in their workforces. The overall implication of these effects is a reduction in value-added and an increased risk of market exit. The value-added reduction is visible on a per-worker basis as well, suggesting that workers who remain at Swedish firms are of lower average productivity than those who leave. This is consistent with the Swedish commuters being positively selected by Norwegian firms. Further, we show that the firm's response to increased competition depends on the labor market structure prior to the shock (competitive versus non-competitive). Specifically, firms with market power are able to leverage their labor rents to absorb some of the increasing costs, while firms in more competitive markets are unable to do so. As a consequence, while all firms experience productivity declines due to the loss of skilled human capital, only firms in competitive markets experience an increased risk of market exit.

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 experience an overall reduction in the number of firms present in the area, a large increase in wage inequality, and substantial population flight. This generates a reduction in local tax revenue, though this is compensated through a mechanical increase in transfers from the national government.[4] Ultimately, we see that the remaining residents in the local communities adjust their voting preferences away from the nationalistic and socially conservative anti-immigration party (the Swedish Democrats) and toward the more traditional social democratic parties with an emphasis on a strong active state, worker

[4]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 are even larger.

protection, and heavy redistribution across individuals.

Fourth, we combine the firm and municipality-level data to show that there is no effect on the market for local goods and services in Sweden. We do this by analyzing sales revenue for local goods and services, house prices, and firms in the tradable goods sector (who produce goods sold in other regions and are therefore less impacted by local demand changes; see Beaudry et al. (2012)). These exercises are valuable because the effect of increased competition on local goods in our setting is theoretically ambiguous. Since Swedes are earning more due to increased commuting, they are likely to spend more locally, which would increase demand for local goods and services and mute any impact we find on firms and local community development. On the other hand, some population is leaving, which would decrease demand for local goods and services and augment any impact we find on firms and local community development. While a potential effect on the market for goods in Sweden does not pose a threat to our identification strategy (it would merely describe a mechanism through which our effects operate), the lack of an effect on this dimension provides strong suggestive evidence that the main channel through which our effects operate is not the goods market. We believe this analysis adds an additional layer of understanding about the links between labor market competition and local community development.

Finally, 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 show that some Norwegian workers are being displaced by Swedish workers. High-skilled Norwegian workers lose their skill monopoly. This causes wage compression at the top of the income distribution and an improvement in wage equality in the border municipalities on the Norwegian side. The communities also see short-lived increased support for parties opposed to further EU integration. We also show that Norwegian firms benefit through cheaper labor costs and higher value-added relative to labor costs, leaving them unambiguously better off than in a world in which they could not take advantage of Swedish labor.

By providing a unified framework for understanding the interconnectedness and fragility of the local community system when one specific aspect of it is being pushed out of its current state, we contribute to the existing literature in several ways.

First, there is a rich literature on the relationship between outside options and worker wages (e.g., Schubert et al. (2020); Caldwell and Danieli (2022); Caldwell and Harmon (2019)). There is a related literature on firm power and labor market concentration (e.g., Schubert et al. (2020); Azar et al. (2020b); Qiu and Sojourner (2019); Rinz (2018); Prager and Schmitt (2021); Azar et al. (2020a); Benmelech et al. (2022); Marinescu et al. (2021); Hershbein et al. (2018); Bassanini et al. (2022); Dodini et al. (2020)). These literatures have been instrumental for understanding the value of increased labor competition for the individual worker. However, this represents but one cog in the wheel, as competition impacts all segments of society – including firms and communities – oftentimes in theoretically ambiguous and opposing ways. A full understanding of the consequences

of labor market competition thus requires an examination of the entire ecosystem of local communities. This is a more difficult question to address, and currently, we have no empirical evidence that speaks to the broader and more general questions of how competition shapes the local business scene and influences community development.

We advance this literature by examining how an exogenous shift in worker outside options—or alternatively, a reduction in effective local labor concentration—affects the entire local economic system, tracing out the snowball effect of changes in the outside options for workers on not only firm behavior and performance but also on local economic development, population growth, inequality, and political voting patterns. In addition, the heterogeneity analysis by prior labor market concentration reveals the importance of understanding market structures when analyzing shocks to outside options.

Second, there are several research strands studying how changes in wage legislation and wage floors like minimum wages affect employment levels (e.g., Neumark and Wascher (2008); Cengiz et al. (2019); Sorkin (2015); Aaronson et al. (2018)), the margins of adjustment through which these effects occur, and their incidence (Harasztosi and Lindner, 2019; Azar et al., 2019; Cengiz et al., 2022; Dustmann et al., 2022). The shock to Swedish workers' outside options through the macroeconomic climate in Norway can effectively be described as a flexible or porous increase in the local wage floor across different occupations and worker types on the Sweden-Norway border.[5] However, there are important differences between a real demand shock, which is driven by a shock to outside options, and an artificial increase in wages, which is driven by legislation. For example, an artificial increase in wages for a very specific type of worker raises the cost for a subcomponent of the labor input, while a shock to outside options can apply to workers across the entire earnings distribution, making input substitution and firm behavioral responses more difficult. We thus advance the impressive literature on this topic (e.g., Mayneris et al. (2018); Hau et al. (2020); Riley and Bondibene (2017); Azar et al. (2019)), providing novel evidence on the consequences of more general wage changes for firm behavior and performance.

Third, 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. (2021); economic distress in Gyöngyösi and Verner (2022); migrants in Steinmayr (2021); austerity in Fetzer (2019); 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

[5]Contrary to some of the earlier work on this topic, which has suffered from identification based on small and temporary shocks (Sorkin, 2015; Aaronson et al., 2018), and similar to some of the more recent work (e.g., Harasztosi and Lindner (2019)), the shock in our setting is not only large but also of a relatively permanent nature. In addition, access to a long post-shock period enables us to explore adjustment effects up to six to ten years after the shock occurred.

attitudes, providing a fuller understanding of the relationship between changes to local economic conditions and political cohesion and polarization.

Finally, we relate to the impressive literature on the impact of immigration on native labor market outcomes as well as on those who remain in the origin country. This literature has its origins in the seminal paper on the Mariel boatlift by Card (1990), and a subset of excellent earlier papers on this topic include Borjas (2003); Ottaviano and Peri (2012); Dustmann et al. (2017). More recent work has attempted to better isolate the flow of migrant workers through the use of plausibly-exogenous shocks to the supply of immigration (Glitz, 2012; Dicarlo, 2022; Hafner, 2021; Beerli et al., 2021; Dustmann et al., 2013; Ortega and Verdugo, 2014) as a way to identify the labor market effect of migrant inflows and outflows on natives.

The general conclusion from these sets of studies is that migration flows may have limited effects on native wages.[6] We complement this literature by using detailed Norwegian register data to examine how a flexible inflow of Swedes across industries and skill levels impact Norwegian workers and firms. Different from prior papers, the inflow of workers in our setting is driven by a shift in the financial benefit of commuting rather than by a relaxation of legal cross-border work policies. This is a more subtle and general change that in the case of work migration that can be applied flexibly to changes in labor competition both within and across countries. On the Norwegian side, we show that some workers are doing slightly worse, that firms are doing better, and that this has important implications for community development in terms of equality, equity, and the political sentiments of the local population. Similar to our main findings on the Swedish side, these results illustrate the value of examining the entire ecosystem of local communities when trying to assess the implication of increased worker in-migration.

2 Institutional Background

2.1 Conceptual Framework

The majority of firms possess some degree of wage-setting power (Card, 2022), and the average labor market is relatively concentrated both across the US and Europe (e.g., Azar et al. (2020b)). This may have detrimental implications for the individual, as such power equips firms with the ability to mark down wages below a worker's marginal revenue product and pay them less than their productivity (e.g., Dodini et al. (2020)). In light of this realization, there has been a recent push to promote competition in the labor market. One example of this is the 2022 Economic Report to the President, in which the injection of competition into local labor markets is highlighted as a prioritized item in the coming years. The idea underlying this argument dates back to Adam Smith's discussion on employer collusion in labor markets in the 18th century, and to the more formal conceptualization of monopsony power by Joan Robinson in the 1930s.

[6] A recent development in this literature takes into account mobility patterns of both natives and immigrants (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.

In theory, an exogenous improvement in the outside option of workers is akin to an upward shift of the local labor supply curve for a worker with a given level of productivity. The implication of increased competition will therefore depend on the wedge between the new outside wage and the status quo (domestic equilibrium) pay. This is illustrated in Panel A of Figure 1. By raising the value of the outside option for workers, domestic firms will have to raise their wages to W' to retain workers, but the higher wages will also force them to reduce the number of workers they can afford to hire from L^* to L'. The wage and personnel effects of increased competition will likely force firms to re-optimize their chosen bundle of production inputs, with potential implications on productivity and value-added. However, with capital being fixed in the short run, this adjustment may take some time. Some firms may not have the capacity to absorb such a cost increase. As a result, firms may be forced to exit the market. Workers willing to work for higher wages exit the domestic market (the blue arrow).

A unique feature of our setting relative to the existing outside option literature is that we have an exogenous improvement in the outside option that applies flexibly to workers across the earnings and occupation distributions. This is best illustrated in Figure 2 (Panel D), where we demonstrate that the cross-border wage gap increased relatively uniformly across all industries. 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, and existence of firms will likely have ripple effects across all segments of society. Specifically, in our setting, firms' ability to respond to (and survive) increased competition 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. Communities may also experience inequality effects across the earnings distribution, local tax revenues may be affected through population changes, and there may be changes in the residents' political sentiments. The size and direction of the effect that changes to the outside option may have on the local community development is an important empirical question that has not been explored through a unified empirical framework before, and something that will be investigated in detail in this paper.

Regarding the side that is imposing the new competition (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 (Panel B of Figure 1). These incoming workers may be willing to accept a lower wage than the prevailing market wage (W^* or along the supply curve with the blue arrow in Panel A) because it is still an improvement over their options on the Swedish side. Total labor supply to the new market shifts outward from L^* to L' and lowers wages in partial equilibrium where workers are substitutable. This allows Norwegian firms to substitute more expensive Norwegian workers for less expensive Swedish workers so long as they are equally productive, moving wages from W^* to W'. This generates an increase in consumer surplus (shaded) for the firms buying

labor.

An important component of the discussion on competition effects on existing firms on the Swedish side relates to what the labor market structure was prior to the shock (competitive versus non-competitive). Understanding the pre-shock labor structure is fundamental for understanding the mechanisms behind any potential reduced-form effects we may observe among firms.

In a perfectly competitive labor market, worker wages are equal to their marginal revenue products: their contribution to employers' bottom lines. Should the employer underpay the worker in such markets, the employee can easily quit and take up employment at another firm in which the marginal revenue product is being paid. In other words, the firm-specific labor supply curve is flat, and each firm can hire whatever amount of labor it wants but only at the market wage.

In a less competitive labor market in which employers have a certain degree of power over labor demand, the story is different. In such markets, firms face upward-sloping labor supply curves, allowing them to pay their workers less than their marginal revenue product. A lack of competition thus equips firms with wage-setting power and enables them to pay wages that are below the productivity of their workers, suppressing the wages of their workers to boost profits.

To illustrate the contrast between competition and market power, consider Panels C and D of Figure 1. Panel C shows what occurs when firms in perfectly competitive labor markets face new competing market wages of W' (up from W^*). Firms forced to move their wages to W' because of new competition move along the labor demand curve and reach a new employment level of L'. Firms that cannot absorb the new market wage due to a lack of productive flexibility will exit the market as their marginal costs of production begin to outstrip their marginal revenues. This action reduces both the number of employed workers and the number of firms in the local market.

Panel D shows a basic monopsony model in which the firm has price-setting power in the labor market. When monopsonistic firms maximize their profits, they set wages below the marginal revenue product of labor and they set employment below the competitive equilibrium. Specifically, workers provide labor supply to the firm at the steeper S' rather than S. This is in contrast to a perfectly competitive firm, which would generate an equilibrium wage W^* and employment level L^*. More specifically, in the monopsony setting, L^M is the point where the labor supply curve to the firm intersects the labor demand curve, resulting in monopsony wages to the workers of W^M. There is, therefore, a wedge between workers' wages and the revenues they generate for the firm each hour.

The injection of competition into the labor market is akin to shifting the local labor supply upwards (or raising the outside wage for a worker). Monopsonistic firms have room to respond to such outside option increases by raising wages from W^M to W^* without a loss of employment (with possible gains in employment) at the firm. Outside option wage offers above W^*, however, will lead firms to reduce their labor demand relative to L^*. If the outside option wage is at or above W', some firms with market power will be unable to absorb the higher wage costs and will exit the

market. In this case, the change in wages is expected to be greater because wages were set at W^M below W^*.

In our empirical analysis, we explore not only the overall impact of competition but also whether firms are differentially affected depending on the pre-shock labor market structure they face. This allows us to more carefully understand the mechanisms through which any potential reduced-form effects operate. To obtain a proxy for labor market concentration, we calculate a Herfindahl-Hirschman Index (HHI), which is the sum of squared employment shares across establishments in each three-digit occupation and municipality. We scale this measure such that it ranges from 0 to 1, where 0 indicates perfect competition and 1 implies a single-firm monopsonistic market. We then aggregate this to the local establishment level, giving us an average labor market concentration measure for each establishment in our analysis. We calculate these values in the year prior to the shock to prevent endogenous changes in concentration from driving our heterogeneous treatment effects.

2.2 Cross-border Commuting

The Norway-Sweden border is 1,619 kilometers long and represents the longest 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, and there are, therefore, customs checks between the countries all along the border.[7] Since 1959, a shared surveillance agreement has been active, through which customs officers from each country can act on behalf of the other country. There are 41 road crossings and 4 railway crossings between the two countries.

Mobility in the Nordic region is primarily driven by Swedish citizens commuting to Denmark and Norway (80 percent). Both Norway and Denmark offer large labor markets with high wages a short distance from the Swedish border, especially attracting early career individuals, males, singles, and people with higher education. Very few Norwegians commute to another Nordic country for work (less than 2,000).[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

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

[8]The average cross-border commuter is below 35 years of age. More than half have a college degree, and two-thirds have more than a high school education. Commuters are found across all industries. Among the high-skilled commuters, doctors, nurses, economists, and technicians, make up the largest groups. Among the low-skilled workers, the service industry and manufacturing industry constitute the largest destination jobs. Individuals without any family commitments are more likely to commute. Men are considerably more likely to commute than women. The average commuting stint is three years. See this analysis from Nordic Labour Journal.

work permits, and even before then, there was a substantial exchange of labor across the border. In terms of institutional barriers, Sweden and Norway are similar in terms of labor market design, education systems, and welfare policies. In addition, the Swedish and Norwegian languages are very similar, and there are few language barriers to working in the other country.[9]

In terms of tax obligations and welfare programs, the general rule is that workers pay taxes (and receive welfare support in terms of pensions, unemployment benefits, parental leave benefits, sick leave, etc.) in their country of work. This applies to all cross-border commuters in the Nordic region. The one exception to this rule relates to workers in Sweden/Finland/Norway who live in a border municipality on one side of the border and work in a border municipality on the other side of the border. In such cases, income taxes are paid in the country of residency.

2.3 The Norwegian Economic Boom

After decades of relatively parallel trends in per capita GDP growth between Norway and Sweden, Norway experienced a disproportionate increase in GDP between 2005 and 2009. The divergence in GDP between Sweden and Norway was not caused by poor economic performance on the Swedish side, but rather by Norway beginning to outperform the rest of the OECD. We illustrate this in Panel A of Figure 2. Relative to Sweden, the Norwegian per capita GDP grew more than 30 percent faster during these four years, after which the relative growth of the two countries began stabilizing again. While several factors contributed to this development, the exceptionally fast increase in oil prices between 2004 and 2008 and a rapidly expanding Norwegian oil sector (primarily in the west and north of Norway) that spilled over to the rest of the economy are often considered among the core mechanisms behind this growth (see Panel A of Figure A1).

Our analysis examines the areas along the borders of Sweden (west) and Norway (east). We will therefore not include workers and firms belonging to the Norwegian oil sector in our estimates. In addition, despite being a large driver of macroeconomic performance, the Norwegian oil industry accounted for a maximum of 7% of total employment in the country at the end of our analysis period (von Brasch et al., 2018). The municipalities with the largest concentrations of petroleum-related employment were Sola and Stavanger on the far west coast with shares of 16% and 14%, meaning that industry-specific local employment shocks are unlikely to affect our treatment and control areas in the east of Norway (Ekeland, 2017). Finally, on both the Swedish and Norwegian sides, our identification strategy will differentiate any macroeconomic country-wide shocks. We discuss this in more detail in Section 3.

The economic boom on the Norwegian side was accompanied by a drop in the unemployment rate (as seen in Figure 2, Panel B) and a substantial increase in the wage level (Panel C). This was not isolated to a particular group of occupations or industries but applied broadly to all jobs in the country (Panel D). Relative to Sweden, this means that the 2005-2009 period witnessed a large increase in the unemployment rate differential as well as a large increase in the within-occupation

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

wage differential. Specifically, while the unemployment rates were relatively similar in 2004 (1.2 percentage point difference), it had grown to a 4.9 percentage point gap in 2009. Similarly, the across-the-board within-occupation wage differential grew substantially over the same period of time.

The rapidly expanding economy of Norway made it difficult for Norwegian firms to find workers and made it beneficial for Swedes to pursue cross-country commuting. This combination of factors can be viewed as a shock to labor market competition on the Swedish side, with Swedish firms now facing more fierce competition over domestic workers. This is especially the case in Swedish municipalities located on the Norwegian border, where Swedish workers can easily commute to neighboring Norwegian municipalities.

As has been shown in prior work, Swedish workers are highly responsive to economic conditions and opportunities in neighboring countries (e.g., Bütikofer et al. (2022)), and it is likely that the economic performance of Norway during these years fueled a large increase in Swedish cross-country commuters. To provide preliminary evidence on this, Figure 4 shows the number of Swedes working in Norway from 2001 through 2014.

In Panel A, we show that there was a stable inflow of cross-border commuters between 2001 and 2005, with an average of 30,000 Swedes working in some capacity in Norway. Beginning in 2005, this number began to rise rapidly, and in 2009 approximately 60,000 Swedes worked in Norway in some capacity. The worker flows in Figure 4 largely correspond with the divergent economic trends between the two countries in Figure 2.

Panel B shows the municipalities on the Norwegian side of the border in which Swedish commuters were working. It plots the percentage point change in the share of total workers commuting from Sweden between 2005 and 2013.[10] Panel C similarly shows the municipalities on the Swedish side of the border from which the commuters came and shows the percentage point change in the share of total workers that commuted into Norway. Together, these figures show that the vast majority of commuting increases were occurring between municipalities located directly on the border between the two countries.

3 Data

3.1 Overview

Our primary data comes from administrative registers at Statistics Sweden and Statistics Norway. These data provide annual demographic and socioeconomic information on all individuals aged 16 through 65 for each year between 1999 and 2015. The demographic data include detailed information on age, gender, marital status, family composition, educational attainment, and

[10] Some of the municipalities in our control group on the Norwegian side have relatively large changes because they are home to large ski resorts. We delineate this using red dots. Swedes that work during the ski season in these resorts but maintain their main residence in Sweden are measured as commuters. Excluding these municipalities from our analysis does not change our results. The shares in some towns in central Norway are high because their base populations are extremely small.

residence location. The socioeconomic information includes details on employment, occupation, industry, earnings, and social welfare participation.

We link the individual-level data to firms using rich employer-employee registers, allowing us to collect information on the firms at which the individuals work. These data include information on the firm's value-added, size, location, industry, and sector. This data covers the private sector, and information on firm performance is therefore not available for establishments operating in the public sector.

Next, we take advantage of a unique agreement between the governments of Sweden and Norway which led to the establishment of a database on worker flows and commuting across the two countries. These data provide individual-level information on all labor market activities of Swedish residents in Norway between 2001 and 2014, including information on employment and earnings as well as on which industry the individual has been active in. These data have not been used for microeconomic research before. We link these data to our main data through individual identifiers constructed by Statistics Sweden.

Acknowledging that increased cross-border worker flows and their implications on firms and workers may impact the political sentiments of the local populations, we collect information on local elections in both countries and examine to what extent the competition exposure affected the political sentiments of local communities.

The above data enable us to examine the implications of increased competition on individuals, firms, and local communities. Table A1 provides summary statistics for individuals (Panel A), firms (Panel B), and local communities (Panel C) included in our analysis on the Swedish side. Table A2 contains the same for the Norwegian side. When reviewing these tables, note that the firms are *not* weighted by size, such that the summary statistics on the individual and firm level can deviate from one another. Because we utilize a difference-in-differences design, we do not require treatment and control groups to be identical, only that they would trend similarly in the absence of the shock (something we explore in Section 4.2).

3.2 Sample Construction

In theory, the increased labor market opportunities generated by the rapidly growing Norwegian economy are available to all Swedes provided that they are willing to commute across the border. As such, all of Sweden was exposed to the Norwegian labor market shock. The main challenge with our analysis is thus to identify observational units in Sweden that are more or less exposed to this shock. This will allow us to define a set of treatment and control units through which we can then disentangle the causal effect of increased competition.

To obtain a set of treatment and control units, we build on previous work which has shown that the cost of commuting increases rapidly with distance (e.g., Le Barbanchon et al. (2021)), and that these types of local labor market shocks in Scandinavia typically do not generate large spatial spillover effects (e.g., Bütikofer et al. (2022)). As such, observational units located close to the

border are likely more impacted by the shock than observational units located farther away from the border, and this provides us with a natural way to categorize treatment and control units.

To examine the impact of increased competition for individuals, firms, and local communities, we compare observational units in Swedish municipalities that border Norway with observational units in municipalities that do not border Norway. In our main specification, our treated municipalities are those municipalities in populous counties (the largest geographic subdivision of Sweden) on the southern end of Sweden, which excludes the very sparsely populated municipalities of northern Sweden. The municipalities we choose to include in the control group are located in counties that border the counties in which the treatment municipalities are located, thus leaving a spatial buffer between treated municipalities and control municipalities. We choose these municipalities as they are geographically close to the main treatment municipalities, but still sufficiently far from the border to not be directly affected by the shock. Panel B of Figure 3 provides a visual illustration of the municipalities we use in our main estimation on the Swedish side.

Note that we do not require that the treatment and control groups are located in the same geographic region or are identical to each other prior to the onset of the shock; we simply need that the control group represents an accurate counterfactual of how the outcomes in the treated group would have evolved absent the shock. One way to provide evidence in support of this assumption is to explore trends in these outcomes across the two groups prior to the shock, which we do in detail in Section 7.

The particular set of municipalities used as controls in our baseline estimation is non-randomly selected. To ensure that this choice does not drive our findings, we will show results from sensitivity analyses in which we randomly alter the set of (non-border) municipalities that are included in the control group 200 times, keeping the total number of control municipalities constant. We will also show results when we include all non-border municipalities in the control group. In a similar vein, we will demonstrate how our estimates change as we redefine and expand the areas included in the treated group. Finally, we will show results when we take a more hands-off approach to the choice of a control group through a synthetic control approach. Taken together, the results from these exercises illustrate that our results are not artifacts of the specific way in which we choose to define treatment and control units; the results are robust to any type of constellation of control municipalities —whether we choose them or the computer chooses them for us.

When we examine the effect on Norwegian workers, firms, and local communities, we follow an identical sample construction process. Specifically, we compare observational units residing in Norwegian municipalities that border Sweden with observational units that are residing in municipalities that do not border Sweden. The municipalities we include in the control group are located in counties that border the counties in which the treatment municipalities are located. In other words, our approach is symmetric across the border. Panel A of Figure 3 provides a visual illustration of the treatment municipalities and control municipalities that we use in our main estimation

on the Norwegian side. Across both panels, the treatment and control groups closely follow the commuting patterns in Figure 4.

3.3 Outcomes in Sweden

Individuals: Our core outcome on the individual level is employment in Norway. We explore this outcome to verify that the changing macroeconomic climate on the Norwegian side induced a response from Swedish workers and thus generated increased labor market competition among Swedish firms. To paint a full picture, we also show results on employment in Sweden as well as on wages both in Norway and in Sweden. The wage measures come from tax records collected in both countries and include individuals with zero wages. Employment is defined as having positive earnings from Sweden or Norway.

Firms: With respect to the effect of increased competition on Swedish firms, we are interested in understanding to what extent the increased competition from Norway generates upward pressure on wages (relative to individual productivity) in Sweden, affects the size of the firm's labor force, impacts the firm's value-added and productivity, and ultimately affects the firm's bankruptcy risk. These outcomes are closely linked to the predictions from the conceptual framework. We also test effects for firms with different levels of market power.

The outcomes we study in the firm-level analysis have all been constructed by Statistics Sweden and are restricted to the private sector. The value-added measure is defined as the total increase in value produced by the company over the year. It is calculated by subtracting the costs of all purchased goods and services that were used as inputs in the production from the value of the actual production carried out by the company. The wage is calculated as the average wage of all salaried workers at the establishment. The number of employees refers to the average number of employees converted to full-time employees in accordance with what is reported in the companies' annual reports.

Local Communities: Our core outcomes on the local community level consist of the number of firms in the municipality, the number of individuals living in the municipality, the total income tax collected by the local government, the total transfers received from the national government through the tax-and-transfer system designed to smooth out wealth differences across municipalities, and a range of income inequality measures: the 50-10 percentile gap, the 90-50 gap, and the 90-10 gap.

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.[11] In gen-

[11] Liberalerna changed its name from Folkpartiet in 2015, and many of the traditional alliances changed after 2018.

eral, 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 on the Norwegian side, 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 that are residents on the Norwegian side. We use these links to construct a measure of total "domestic workers" connected to the firm. 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.[12] Firm value added on the Norwegian side is total firm sales revenue minus input costs, namely cost of goods sold and labor costs.[13]

At the municipality level, because parties are smaller and coalitions differ significantly across local areas and over time on the Norwegian side, we aggregate vote shares across parties related to a core issue that may disproportionately affect those in border municipalities: European Union integration. Several parties were strongly opposed to further EU integration during the whole period we study, including Senterpartiet (Centre Party), Kristelig Folkeparti (Christian Democrats), Sosialistisk Venstreparti (Socialist Left), and Fremskrittspartiet (Progress Party). These parties span much of the typical political spectrum from left to right. Those that supported EU integration were Venstre (Liberal), Høyre (Conservative), and Arbeiderpartiet (Labour). We construct vote shares for each broad coalition in local municipality elections.

However, this is after our analysis period ends.

[12] 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.

[13] Due to data limitations, our construction of firm value added may differ from that in the Swedish firm registers. Value added in the Swedish data does not break down its individual components in the raw data, so we cannot replicate it on the Norwegian side. This is not problematic insofar as our analysis captures changes in these outcomes within firms over time.

4 Empirical Method

4.1 Estimation Strategy

Our analysis is based on a conventional difference-in-differences framework in which we compare the outcomes of observational units (individuals, firms, or municipalities) in areas in Sweden bordering Norway with the outcomes of observational units in other areas and cities of Sweden.

As illustrated in Figure 2, the Norwegian economy diverged from the rest of the OECD over a four-year period, from 2005 until 2009, at which point it reached a new steady state. This suggests that any potential effects are likely to increase over time, beginning in 2005 and being fully phased in after 2009. To this end, we begin by estimating non-parametric event study models that allow us to trace the treatment effects over time. The models differ slightly depending on our unit of observation (individual, firm, or municipality), but the general estimating equation can be depicted 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 an individual, 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, and zero otherwise. 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.

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 over time. In our firm-level regressions, we also include a set of firm fixed effects, to net out any time-invariant systematic differences across firms.[14]

It is important to note that 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. However, over 90% of the observed firm units have the entirety of their employment within the same municipality.

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

[14] In Appendix Table A5, we relax this restriction by omitting firm fixed effects, which allows for more flexibility regarding the composition of firms in the municipality. The results indicate starker effects when omitting these fixed effects, suggesting that the firms that exited had larger reductions in performance and greater average increases in worker earnings prior to exit.

$$Y_{it} = \alpha_i + \beta_1 Treat_m + \beta_2 PhaseIn_t + \beta_3 FullExposure_t + \beta_4(Treat_m * PhaseIn_t) + \beta_5(Treat_m * FullExposure_t) + Z'\gamma + \varepsilon_{it}, \quad (2)$$

where $PhaseIn_t$ is a dummy variable equal to one for observations between the years 2005 and 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 year 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.

Identification of causal effects through Equations 1 and 2 requires that the positive shock that Norway experienced is uncorrelated with prior trends in Swedish border municipalities over time relative to the control municipalities. Identification also requires that there are no policies or shocks contemporaneous with the Norwegian shock that occurred in the Swedish border municipalities relative to the 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 over time matched those in the control municipalities. In Section 7, we conduct a number of robustness exercises to further explore this assumption. Importantly, we alter the control group 200 times through a randomization procedure to ensure that our findings are not dependent on a particular set of control municipalities, and we implement a synthetic control approach to ensure that our results are robust to letting the computer choose the control units for us.

With respect to other events that occur contemporaneously with the shock in Norway and that differentially affect our treatment and control groups, we note that no other local policies were implemented in the period 2005-2009 that could plausibly explain the rapid rise of Swedish cross-border workers that we observe. In addition, border areas both on the Norwegian and Swedish sides were not differentially affected by inflows of migrants following the EU expansion in 2004 (see Appendix Figure A1). Our robustness tests in which we randomize the choice of control municipalities and expand our treatment area also ensure that differential shocks in the treatment and our selected control municipalities are not driving our results.

4.2 Validation of Commuting Shock

Exploiting the Norwegian macroeconomic shock as an injection of labor competition for Swedish firms requires that the shock actually did lead workers in the border communities of Sweden to begin commuting to Norway to a much greater extent. In this subsection, we present both descriptive and causal evidence of this being the case.

First, Panel A of Figure 4 provides information on the number of Swedes who receive any form

of labor income from Norway for each year between 2001 and 2014. This is a purely descriptive plot, showing raw trends in commuting without controlling for any potential confounders. The figure demonstrates that the number of Swedes working in Norway was stable at 30,000 in all years prior to the 2005 shock. The figure also demonstrates that the onset of the shock generated a large increase in the number of Swedes working in Norway, rising rapidly each year between 2005 and 2009. After 2009, when the Norwegian economy re-stabilizes at a higher level, the commuting behavior of Swedes also stabilizes, also at a much higher level. Specifically, the number of Swedes working in Norway more than doubled during these four years.

Second, Panel B of Figure 4 provides information on which municipalities and counties in Norway experienced the largest increase in the share of Swedish commuters over our sample period. Panel C of Figure 4 provides information on which municipalities and counties in Sweden experienced the largest relative outflow of workers to Norway over this time period. The Norwegian macroeconomic shock generated very local labor shocks on the Swedish side, with the largest changes occurring in municipalities just at the border of Norway. Most of these people chose to commute to and work in areas in Norway that were located very close to the border as well. These patterns are expected, as the relative cost of commuting for workers increases with distance from the border. The results are also encouraging, as it highlights that most of Sweden were not directly affected by the Norwegian boom such that they can be used to identify credible counterfactuals.

Third, Panel A of Figure 5 provides evidence on raw trends in the probability that Swedes work across the border separately for our chosen control and treatment groups, from 2001 through 2013. The figure establishes three important results. First, the figure shows that the both the control and the treatment group had relatively flat raw trends prior to the macroeconomic shock on the Norwegian side. Second, at the start of the shock, there is a gradual increase in the share of Swedes in the treatment group working in Norway. This gradual increase does not level off until 2009, the year at which the macroeconomic shock on the Norwegian side is considered to have ended (see Section 2). At this point, an average of 12 percent of the local populations in the Swedish border municipalities worked in Norway in some capacity. Third, there is no visibly meaningful change in the share of Swedes in the control group working in Norway as a function of the shock.

Fourth, Panel B of Figure 5 demonstrates that the above result is identical if we let the computer choose the control units via a synthetic control approach rather than if we select the control units ourselves based on geographic proximity to the border.[15]

Taken together, these four pieces of evidence provide clear evidence of an increase in local

[15]To construct the synthetic control, we match regions based on demographic composition (age, gender and education level) as well as labor market activity (earnings and employment) in the pre-treatment period (years 2001 through 2004). We allow all non-border municipalities in Sweden that are not located in the treated group's county and to be part of the donor pool, excluding the three largest metropolitan areas (Stockholm, Gothenburg and Malmo). Results are similar if we match on other characteristics or relax the donor pool restrictions.

competition over labor in Swedish border municipalities, and that this increase in competition is coming from an expansion of the workers' labor market opportunities in Norway.

To better isolate the effect on Swedish workers and offer an easier way to interpret the magnitude of the effect, Panel C of Figure 5 provides results from the estimation of Equation 2. The main outcome of interest – the probability of working in Norway – is shown in Column (1). To better understand the dynamics of this shift in worker outside options, we also show the effect on earnings in Norway as well as total earnings (from both Norway and Sweden). As discussed above, Equation 2 is based on a difference-in-differences framework, in which we compare the outcomes of Swedish individuals in areas bordering Norway with the outcomes of Swedish individuals in other areas and cities of Sweden. This design exploits the geography of Sweden and Norway, which ensures that only Swedish communities close to the Norwegian border will be affected by the improved labor market climate in Norway; other communities were simply too far from the border to be impacted by it. This argument is reinforced by the descriptive statistics on outflows from Sweden provided in Figure 4 as well as on the raw trends in commuting shown in Figure 4.

Panel C of Figure 5 demonstrates that Swedish workers responded to the improved opportunities on the Norwegian side by beginning to commute across the border at a higher frequency (Column 1). This effect gradually increases over the phase-in period of 2005-2009, after which it reaches a new steady state in 2010. At this point in time, Swedes in border municipalities are approximately 4 percentage points more likely to work in Norway.[16] Importantly, when we split the sample at the median annual earnings in the municipality, the full exposure coefficient for those above the median is 0.06 compared to 0.01 for those below the median, meaning that nearly all of the commuting effect is being driven by those above their municipality median income.

The impact on commuting probability translates into a large positive effect on employment earnings in Norway, following the same time patterns as that which we observe for employment. The large increase in employment earnings in Norway generates a large and economically meaningful effect on the total employment earnings of Swedish workers at the border. This is expected, as individuals would not pursue the new opportunities on the Norwegian side unless they would generate an improvement in their outcomes relative to staying in Sweden. In Appendix Table A3, we present descriptive statistics for the types of workers that commuted during our sample period and took advantage of employment opportunities in Norway. Commuters in our sample from Sweden are more likely to be male, have a college degree, and have higher annual earnings than non-commuters. They are less likely to be married or have children.

On the Norwegian side of the border, a simple comparison of our proposed treatment and control groups acts as further validation. In 2013, near the end of our sample period, commuters

[16] In Appendix Table A4, we show that the increase in commuting activity is widespread across various industries. While there is some heterogeneity in these effects ranging from approximately 1.6 to 6.1 percentage points, there are significant changes in commuting intensity across nearly every major industry group in our treatment municipalities relative to control municipalities.

from Sweden accounted for an average of 2 percent of each municipality's total workforce in our control municipalities. In the treatment municipalities located on the border with Sweden, on average, commuters made up over 11 percent of workers employed in 2013. This provides further evidence of just how localized labor market integration and competition were over the sample period.

When considering this time period of rapid growth on the Norwegian side, one might believe that higher-income Norwegians increase their purchases of Swedish goods and services. This would increase the demand for local goods and services on the Swedish side of the border and raise their profits such that they are better able to respond to increases in labor market competition. This would effectively mute any potential effect of increased labor market competition and cause us to estimate lower-bound effects. However, there does not appear to be strongly differential changes in cross-border trade over this period in border municipalities and non-border municipalities, either on the Swedish (buyer destination) side or the Norway (buyer source) side (Figure A2). One reason for this may be the fact that the exchange rate was not changing substantially in this period (Panel B of Figure A1), nor was inflation, thus keeping incentives to shop across the border stable. While there is some increase in trade in Strömstad compared to the two other main border trade destinations, this increase does not occur until after 2009, after the increase in commuting had already leveled off, which is inconsistent with the time pattern of effects in our event studies. This reinforces the idea that we are measuring the effects of very local labor shocks rather than product demand side effects spilling over from the Norwegian side.

Before turning to the results, it should also be noted that while the macroeconomic shock we exploit on the Norwegian side is not to the market of goods but rather to the market of labor, there could still be an impact on the market of goods in Sweden in general equilibrium. Specifically, if Swedes are earning more, they are likely to spend more, which would increase demand for local goods and services and mute any impact we find on firms and local community development. On the other hand, if the shock leads to population flight, then demand for local goods and services would decrease and augment any impact we find on firms and local community development. This is not a threat to identification but rather an interesting mechanism through which our effects may operate. In Section 6, we examine this in detail. In this section, we also estimate our main firm analysis for the sample of firms operating in the tradable goods sector and sell products to other regions (and are thus less influenced by local demand changes; see Beaudry et al. (2012)).

Taken together, we interpret the result presented in this section as evidence of the Norwegian macroeconomic shock generating increased incentives for Swedes to commute to Norway and as strong evidence of an increase in labor market competition for Swedish firms on the Norwegian border.

5 Results

In this Section, we present all our main findings. Unless otherwise specified, we focus on the results produced by the simplified difference-in-differences framework (Equation 2) rather than the event study design (Equation 1). This is purely for expositional purposes due to the large number of results in the analysis. In the Online Appendix, we provide detailed results on all outcomes based on Equation 1 as well. Overall, the event studies show that there is no evidence of pre-treatment trends that differentially operate in treatment and control areas and that also are correlated with the outcomes in a way that biases our results.

5.1 Effect on Swedish Firms

The key findings from our analysis on firms in Sweden are presented in Table 1, showing the difference-in-differences estimates on firm outcomes both during the phase-in period as well as during the full exposure period. The outcomes we examine are: Number of workers (Column 1), average worker earnings (Column 2), firm value added (VA) (Column 3), firm VA per capita (Column 4), average markdown (Column 5), and the probability of exiting the market (Column 6).

First, Column 1 of Panel A shows that firms on the Swedish side lost workers as a result of increased labor market competition. As noted earlier in Section 4.2, commuters to Norway were positively selected and disproportionately likely to be above their municipality's median income in 2004.[17] This means that the workers who stayed at firms on the Swedish side had lower pre-shock wages and possibly were less productive than the workers the firms lost. In Column 2, we demonstrate that, for the workers who stayed at Swedish firms, average pay increased modestly during the full exposure period. As shown in the Appendix Figure A3, at the end of the analysis period, Swedish firms on the border paid wages that were higher than those paid by firms in control municipalities (significant at the 10 percent level). However, average pay only tells us a part of the story. If the average worker is paid the same, but the average quality of the worker has decreased, then their actual wage relative to their productivity has substantially increased. This would be consistent with the idea that Swedish firms began struggling to retain high-productivity workers and significantly reduced the wage markdowns of remaining workers. We show evidence of this below.

Second, Panel A Column 3 and Panel B Column 1 show that the workforce reduction generates a drop in the firms' value-added, not only in the aggregate but also on a per capita basis. This suggests that the individual workers retained (or newly employed) by the firms enjoy only marginally higher nominal wages but are of a lower quality relative to those who leave. That is, their wages relative to their productivity have increased substantially in response to the competition from the Norwegian side. This result aligns well with the conceptual framework provided in Section 2.1.

[17] Specifically, when we split the sample at the median annual earnings in the municipality, the full exposure coefficient for those above the median is 0.06 compared to 0.01 for those below the median, meaning that nearly all of the commuting effect is being driven by those above their municipality median income.

An alternative potential explanation for the drop in per capita VA is that even if the productivity of the retained (newly hired) workers is similar to that of those who leave, the firms now have less labor for a given amount of capital, and it may just not be enough to maintain production efficiency. However, our heterogeneity results by market concentration (below) provide strong evidence that the per capita VA effects are driven by the retained workers being of lower quality than those who leave.

Third, Panel B Column 2 shows that the average markdowns as measured by the difference in per capita value added and average worker wage shrink dramatically following the shock. This shows that firms are responding to the shock by reallocating some of their quasi-rents from the labor side back to the workers. This provides an informative summary measure for thinking about the strategic decisions of firms in response to new competition.

Finally, Panel B Column 3 illustrates that a nontrivial share of firms are unable to absorb the higher labor costs required to retain their workforce, and are therefore exiting the market altogether. Relative to the pre-shock mean, this effect is sizable.

When interpreting these results, it is worth bearing in mind that Swedes commuting to Norway for work are likely to spend most of their higher wages on local goods and services in Sweden, given that prices are considerably lower on the Swedish side of the border. If anything, this would help local Swedish firms and push against us finding adverse effects on firm behavior and performance on the Swedish side (unless such effects are offset by, for example, a population decline due to reduced firm activity in the area). Thus, the adverse effects we identify here occur despite a potential increase in local demand induced by higher wages of Swedes in the communities. We will directly examine this question in Section 6.

To what extent are the above result driven by the pre-existing market structures on the Swedish side? Based on the conceptual framework in Section 2.1, we would expect that the degree of labor market competition that the Swedish firms were exposed to prior to the shock affects their ability to respond to the shock. To this end, we construct labor market concentration indices as specified in Section 3 and estimate the above results for firms that were more or less exposed to competition in the pre-shock period.

Market concentration is calculated using the Herfindahl-Hirschman Index for each 3-digit occupation in each municipality. The HHI is the sum of the squares of the labor shares of the firm within the occupation and municipality. The measure is proportional to the average labor share, weighted by labor share. It can range from 0 to 1, where 1 is indicative of a single monopolistic firm in the market. Hence, the HHI measures the concentration of labor demand for a given occupation across firms in a local labor market. We take the average HHI faced by the firm in each of the occupations that the firm employs, weighted by the relative share that the occupation makes up of the firm's labor force. We then interact our treatment indicator with the continuous measure of market concentration and study whether increased competition differentially affected

firm outcomes by pre-shock market structure.

The results from this exercise are provided in Table 2. Most of the average firm response is being driven by firms in more concentrated local labor markets. Although we do not find evidence of differential responses with respect to workforce size and wages, we find that firms in more concentrated markets experience much greater reductions in value-added, a more substantial decline in markdowns, and a much smaller (zero) effect on the risk of market exit. In other words, firms in concentrated markets lose their more productive workers at higher rates but do not pay the remaining workers any less. This set of results is consistent with the conceptual framework in Section 2.1, in which firms with monopsonistic power are able to absorb some of the increasing costs by reallocating quasi-rents to workers, thereby avoiding firm exit.

5.2 Effect on Swedish Communities

The core findings from our analysis of local communities in Sweden are presented in Table 3, showing the difference-in-differences estimates on a range of key community outcomes both during the phase-in period as well as during the full exposure period. The outcomes we examine are earnings inequality (90-10, 90-50, and 50-10 gaps), number of firms, population size, tax revenue, and social support equalization.

Panel A Column 1 demonstrates that the increased labor market competition generates a substantial increase in the 90-10 percentile gap. This gap grows over time, with the full exposure effect being approximately 100 percent larger than the phase in effect. Panel A Columns 2 and 3 reveal that this increase in inequality is driven by changes in the top of the distribution: while there is a substantial effect on the 90-50 gap, there is a much smaller effect on the 50-10 gap. This distributional effect is anticipated in light of the positive selection of Swedes to the Norwegian labor market (Appendix Table A3).

In Panel B Column 1, we demonstrate that the increased competition also leads to a drop in the number of establishments present in the border municipalities. This reaffirms the evidence from the firm-level analysis above, indicating that a non-trivial share of Swedish firms was unable to efficiently reallocate resources across production inputs and absorb the increased labor costs, inducing an increase in market exit.

In Panel B Column 2, we find a sharp decline in the size of the municipalities following the change in labor competition. This effect is not driven by an outflow of workers to Norway, as most of these individuals choose to live in Sweden and commute to Norway. We conjecture that this effect is thus more likely to be driven by the reduction in economic activity brought about by the decline in the number of establishments in the areas, making the regions less attractive for certain subgroups of the population (despite the increased opportunities on the Norwegian side). Another potential contributing factor is the rapidly changing inequality in the neighborhoods, which could reduce the appeal to remain in the areas for certain subgroups.

The above results suggest that the increased competition likely implicates public budgets in

border municipalities. We study this possibility in Panel B Column 3 and Panel C Column 1, examining the impact of the shock on local tax revenue as well as social support equalization. In the aggregate, both these sources of revenue decline due to the observed effects on establishments and workers. However, on a per capita basis (Panel C Columns 2 and 3), the decline in tax revenue per capita 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. As discussed in Section 3, the social support equalization scheme is relatively unique to the Scandinavian setting and is likely to mute the competition's impact on the local communities. It is thus possible that increased competition would have even larger effects in areas where such schemes do not exist.[18]

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.[19]

Panels A through C of Figure 6 plot 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 strong suggestive evidence of a clear shift away from the Swedish Democrats whose political agenda strongly centers around anti-immigration and socially conservative policies (with a flat and non-existent pre-trend in the ten years leading up to the shock). At the same time, the figure shows a significant increase in support for the center-left alliance. The shift in the political sentiment in the border municipalities is not only statistically significant at conventional levels but also economically meaningful. The results suggest that increased competition, and all the implications brought about by increased competition, 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. Note that this shift in sentiment can be driven both by changing sentiments among those who remain in the communities and by the compositional changes caused by the reduction in population growth.

5.3 Effect on Norwegian Firms

On the Norwegian side, the commuter shock comes on top of the national economic boom and inflow of migrants from other European countries following the EU expansion in 2004 (discussed in section 2). We showed two pieces of evidence in Section 4.2 that our treatment border munic-

[18] One might consider general equilibrium effects on Swedish firms, namely that a fall in population may depress demand for the goods produced by remaining firms. However, that would not explain the time pattern of the effects (coincident purely with the commuting shock), the positive effect on worker earnings at Swedish firms (particularly in the specification without firm fixed effects in Table A5), nor our observed heterogeneous effects over HHI.

[19] 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.

ipalities and control municipalities are not differentially affected by inflows of immigrants from other countries, including Swedes taking up residence in Norway. However, we emphasize that estimates for Norway are not as cleanly identified as for the Swedish side.

The key findings for our analysis on the Norwegian side are located in Table 4. Panel A shows that there is some substitution away from domestic Norwegian workers in firms in border municipalities. In terms of magnitude, the effect of this substitution is approximately 0.88 workers. Column 2 suggests that total personnel costs are decreasing by approximately 810,000 NOK, which is more than the mean annual earnings of approximately 370,000 NOK for a worker in Norway over this period. This is consistent with Norwegian firms substituting for Swedish commuters at high rates on the border (in place of Norwegians in the upper quantiles of the distribution) and paying them significantly less than their Norwegian-resident counterparts. In part due to this possible substitution, Panel B Column 1 shows that value-added per domestic worker marginally increases by 36,000 NOK. This likely reflects the effect of hiring Swedish commuters because commuters would increase the numerator in Panel A Column 3 (or keep it flat) while the denominator falls. The net effect in Column 2 of Panel B suggests that production per NOK spent on wages increases marginally, consistent with the firms being able to generate similar total value-added amounts at lower personnel costs. Column 3 of Panel B shows that personnel costs as a share of total operating costs decrease by about half of one percentage point.

Overall, these results suggest that the effect of commuters on firms on the Norwegian side is small due to the booming Norwegian economy absorbing most of the inflow of new workers on top of the existing workforce. However, there is evidence of some substitution away from domestic workers and a total reduction in payrolls. Norwegian firms reap the benefits of this cheaper labor and produce relatively more output for the cost of that labor.

When we estimate our models for firms with interactions with concentration, we find that most of the average firm response is being driven by firms in more concentrated local labor markets, as detailed in Table 5. Though we lose some precision in estimating the outcomes in Panel A, Panel B suggest that firms in more concentrated local labor markets on the Norwegian side reduce their employment of domestic Norwegian workers, strongly increase their value-added per domestic worker and value-added per NOK in personnel costs, and strongly reduce personnel costs as a share of total costs. The effects on firms in more competitive local labor markets are generally small and not statistically distinguishable from zero. These results are consistent with a pattern of monopsonistic discrimination wherein firms with more market power are able to bid down the wages of commuting Swedish workers closer to their reservation wage, which is lower than their Norwegian counterparts. In a perfectly competitive market in which both Norwegian workers and Swedish commuters are paid their marginal revenue product, firms will not have the ability to pay equally productive Swedish commuters less.

5.4 Effect on Norwegian Communities

Table 6 presents results for Norwegian municipalities. Column 1 shows that the top of the earnings distribution falls significantly as relatively well-educated Swedes enter the local labor markets as commuters. By the end of the sample period, the 90th percentile of the distribution in treatment municipalities fell by approximately 13,000 NOK. The municipality median (Column 2) falls marginally by approximately 2,900 NOK. There is no significant effect at the bottom of the distribution (Column 3). Because of this pattern, we see a significant contraction of gaps across the income distribution in Panel B, particularly with respect to the 90/10 and 90/50 gaps (Columns 1 and 2).

In Panel C of Table 6 we see that there are no statistically significant effects on treatment municipalities in terms of the number of firms, the number of domestic workers employed, and population.

Overall, these results suggest that the highest-income domestic workers may be losing to cheaper Swedish labor, which may indicate that these domestic workers formerly had a monopoly over very high-skilled labor. Increases in the supply of these workers coming from the Swedish side may have reduced these rents. The net effect is a strong reduction in income inequality among residents in Norwegian municipalities. In Appendix Figure A19, there is some evidence that displaced Norwegian workers begin working in nearby municipalities in the same county.

Finally, the increased labor market competition from Swedish commuters may have an impact on the political sentiments of the local populations on the Norwegian side. In Norway, because parties are smaller and coalitions differ significantly across local areas and over time, we aggregate vote shares across parties related to a core issue that may disproportionately affect those in border municipalities: European Union integration. Several parties were strongly opposed to further EU integration during the whole period we study, including Senterpartiet (Centre Party), Kristelig Folkeparti (Christian Democrats), Sosialistisk Venstreparti (Socialist Left), and Fremskrittspartiet (Progress Party). These parties span much of the typical political spectrum from left to right. Those that supported EU integration were Venstre (Liberal), Høyre (Conservative), and Arbeiderpartiet (Labour).

Panel B of Figure 6 plots the share of votes received by the groups "protectionist" and "market integration" in local municipalities. The results show a shift from market integration parties towards protectionist parties. This shift is interesting in light of the tension between two key observations: first, Norwegian firms benefit from the use of cheaper labor from Swedish commuters; second, some Norwegian workers in the upper half of the distribution may be displaced. That voters disproportionately shift their priorities against further labor market integration in these border municipalities may be a sign that worker concerns in border municipalities carry more political weight than the concerns of establishment owners. However, these effects are only visible in the short-run during the initial and large inflow of Swedes; in 2014, the voting patterns appear to have

returned to pre-shock levels. As such, these results should be interpreted with caution.

6 The Goods Market

As shown in Figure A2, the macroeconomic shock we exploit on the Norwegian side is not to the market of goods but rather to the market of labor. However, there could still be an impact on the market of goods in Sweden in general equilibrium. Specifically, since Swedes are earning more, they are likely to spend more, which would increase demand for local goods and services and mute any impact we find on firms and local community development. On the other hand, some population is leaving, which would decrease demand for local goods and services and augment any impact we find on firms and local community development.

The potential effect on the market of goods in Sweden in general equilibrium does not pose a threat to our identification strategy, as our goal is to explore the overall impact of increased labor market competition on the full ecosystem of local communities. However, the goods market may represent an important channel through which the effects we identify operate. To better understand the role of the goods market in generating our results, we perform a series of supplemental analyses.

First, we examine the effect of increased labor market competition on the sales revenue in the retail, hotel, and restaurant industries in the control versus the treated areas. The idea underlying this exercise is to explore to what extent the demand for locally produced and consumed goods and services has shifted in response to the shock that we exploit. This is interesting because the analysis has revealed two opposing forces impacting the demand for local goods and services: an increase in wages versus a decline in population. Second, we explore the effect on house prices in the treatment and control areas. We do this to obtain an even deeper understanding of how the increased labor market competition, and all its documented effects, influence prices in local areas. This is an interesting outcome to explore because while certain individuals have become richer (and can thus afford to pay more for properties), some individuals have left the communities (which would drive down the prices of properties). Finally, we borrow insights from Beaudry et al. (2012) and Caldwell and Danieli (2022) and re-estimate our firm effects focusing on firms of tradable goods that are sold to other regions. We perform this exercise because these firms are arguably unaffected by changes to very local demand, and this approach therefore allows us to identify the competition effect net of any effect operating through local demand.

The results from our supplemental analyses on house prices and local goods sales revenue are shown in Table A6, and the effects on firms in the tradable goods sector are shown in Table A7. The results demonstrate that the shock to outside options had no impact on the aggregate sales revenue of firms producing locally consumed goods and services, suggesting that the increased income from commuting and the population decrease have offsetting effects. Second, we find no effects on house prices, again suggesting that the increase in disposable income among individuals in the treated areas is offset by the population decline and inequality increase. Third, the effect of increased competition has a similar impact on firms in the tradable goods sectors as it has on

firms in other sectors. Taken together, these three analyses provide strong suggestive evidence that the main channel through which our effects operate is not the goods market. We believe this is an interesting finding, adding an additional layer to our understanding of the links between labor market competition and local community development.

7 Identification Concerns

To ensure that our results are not driven by particular features of our research design, we conduct a series of robustness and sensitivity analyses on our main findings. These exercises can largely be divided into four groups: those that serve to examine the robustness and sensitivity of our results to the particular choice of control units, those that aim to ensure that there are no threats to identification in terms of pre-existing differences in trends across treatment and control units, those that are trying to rule out alternative explanations, and those that provide alternative estimation approaches to provide complementary evidence on causal identification. We discuss each of these exercises in turn below.

Pre-trends and Event Studies. The discussion so far has centered on results produced by Equation 2. Identification of causal effects through Equations 2 requires that the positive shock that Norway experienced is uncorrelated with prior trends in Swedish border municipalities over time relative to the control municipalities. Identification also requires that there are no policies or shocks contemporaneous with the Norwegian shock that occurred in the Swedish border municipalities relative to the control municipalities.

As discussed in Section 4, one way to obtain suggestive evidence in support of this assumption is to estimate a set of event studies using Equation 1. In this framework, 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 over time matched those in the control municipalities. The results from this exercise are provided in Figure A3 for Swedish firms, Figures A4 and A5 for Swedish communities, Figure A6 for Norwegian firms, and Figures A7 and A8 for Norwegian communities. Overall, these figures suggest that treatment and control groups are trending similarly prior to the onset of the macroeconomic shock across nearly every outcome and that there are no consistent differential trends in the pre-shock period across outcomes that risk contaminating the effects of increased labor market competition that we find. While we acknowledge that the parallel trend assumption cannot be directly tested in empirical analyses, we note that these event studies are consistent with the required assumption.

Permutation of Controls. One challenge with the current analysis relates to the choice of the control group. The municipalities we choose to include in the control group are located in counties (the largest geographic subdivision of Sweden) that border the counties in which the treatment municipalities are located, thus leaving a spatial buffer between treated municipalities and control municipalities. We choose these municipalities as they are geographically close to the main treatment municipalities, but still sufficiently far from the border to not be directly affected

by the shock.

The particular set of municipalities used as controls in our baseline estimation is non-randomly selected. To ensure that this choice does not drive our findings, we perform a permutation exercise in which we randomly allocate 60 municipalities in Sweden (79 in Norway), excluding the border municipalities, to the control group. We choose 60 municipalities in Sweden (79 in Norway) to make this exercise comparable to our baseline estimates in which we have 60 (79) municipalities in the control group. We do this 200 times (with replacement) and re-estimate our main results using each of these alternative control groups. We then plot the distribution of coefficients. The results from this exercise are shown in Figures A9 and A10 for Sweden and in Figures A11 and A12 for Norway.

With respect to the analysis for Sweden, all 200 alternative estimates produce results remarkably similar to the baseline results, illustrating that the particular set of controls has no impact on the outcomes presented in this paper. With respect to the analysis for Norway, this exercise suggests that our base estimates may be conservative with regards to the negative earnings effect at the 90th percentile and median in the municipality as well as the effects on firms and domestic workers. This is, perhaps, unsurprising given that the positive macroeconomic shock we exploit for our empirical design is being generated on the Norwegian side of the border. These shocks may have been unevenly spatially distributed, especially to areas where natural resource extraction grew immensely but the population did not (in the north and west). When we expand the set of possible control municipalities to these areas that may have experienced disproportionate positive shocks and are less similar to the treatment municipalities, the treatment effects increase along the dimensions one would expect.

In addition to randomly reassigning municipalities to the control group, we have also estimated the main regressions using all non-border municipalities as controls, excluding the largest metropolitan areas (Stockholm, Gothenburg, and Malmö in the Sweden analysis, and Oslo, Bergen, Trondheim in the Norway analysis). In this analysis, the composition of control municipalities is more different from our treatment group than our main control group. At the same time, it helps us determine whether the border municipalities are put on a completely different outcome trajectory relative to the rest of the country following the onset of the Norwegian shock. The results from this exercise are shown in Figures A13 and A14 for Sweden and in Figure A15 for Norway.

With respect to the analysis for Sweden, this adjustment has no impact on our main estimates. With respect to the analysis for Norway, much as in the permutation discussed above, the inclusion of more municipalities in Norway in the west and the north tends to exacerbate the treatment effects we find as these areas were disproportionate beneficiaries of economic growth over this time period.[20]

Synthetic Control. The goal of the permutation exercise described above is to ensure that the

[20] Including the large metropolitan areas does not impact this finding. These results are available upon request.

set of results we find are not driven by our particular choice of control units. An alternative way of examining this question is to apply a synthetic control approach (Abadie et al., 2010). To simplify, we collapse our border municipalities into an average of the outcomes and then we match this to a weighted combination of non-treated units that has been synthetically created to look as similar to the treatment group as possible.

To construct this control, we match regions based on demographic composition (age, gender, and education level) as well as labor market activity (earnings and employment) in the pre-treatment period (years 2001 through 2004). We allow all non-border municipalities in Sweden that are not located in the treated group's county to be part of the donor pool, excluding the three largest metropolitan areas (Stockholm, Gothenburg and Malmö). The results are similar if we match on other characteristics or relax the donor pool restrictions.

To facilitate comparisons to our other estimates, we trace changes in the treated group in comparison to the synthetic control over the "phase in" and "full exposure" periods and present these gaps in the appendix. The results from this exercise are provided in Tables A8 through A10. Taken together, the results from the synthetic control approach are very similar to our baseline results, nearly all of which are within one standard error of our main difference-in-differences estimates. This provides another layer of support in favor of our identifying assumptions and helps strengthen our claims revolving around uncovering a causal relationship between labor market competition and a range of firm and community outcomes.

Spillovers. In the main analysis, the treatment municipalities are restricted to the populous border municipalities in the south. This is a subjective and active choice made by us in order to focus on the most intensely treated areas of Sweden. However, it is interesting to examine to what extent the sparser border municipalities in the North are affected by the shock and whether there are any spillover effects to municipalities that are in close proximity of (but 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 border Norway. 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 should the effects be) and in examining potential spillover effects. The results are shown in Figures A16, A17 and A18 for Sweden and in Figures A19 and A20 for Norway.

In Sweden, the results illustrate the gradual expansion of the treatment group to encompass all border municipalities leads to slightly muted but still statistically significant and economically

meaningful effects. The results further show that there are little to no spillover effects on municipalities that are not on the border. This demonstrates how localized the labor competition shock was, and reinforces our arguments that the SUTVA likely holds and that our selected set of control and treatment municipalities are appropriate. This result is also interesting from a policy perspective, highlighting the very local nature of labor market shocks and the implication on 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. 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.

Product Market Shocks. One may be concerned that the increase in labor market integration that occurred over this period might coincide with an increase in product market integration or cross-border trade. Specifically, when considering this time period of rapid growth on the Norwegian side, one might believe that higher-income Norwegians increase their purchases of Swedish goods and services. This would increase the demand for local goods and services on the Swedish side of the border and raise their profits such that they are better able to respond to increases in labor market competition. If true, this would mute any potential effect of increased labor market competition on Swedish firms and communities, attenuating our results and causing us to estimate lower-bound effects.

To assess the extent to which our results can be interpreted as lower bounds, we explore statistics on cross-border trade over this time period. Overall, there does not appear to be strongly differential changes in cross-border trade over this period in border municipalities and non-border municipalities, either on the Swedish (buyer destination) side or the Norway (buyer source) side (Figure A2). One reason for this may be the fact that the exchange rate was not changing substantially in this period (Panel B of Figure A1), nor was inflation, thus keeping incentives to shop across the border stable. While there is some increase in trade in Strömstad compared to the two other main border trade destinations, this increase does not occur until after 2009, after the increase in commuting had already leveled off, which is inconsistent with the time pattern of effects in our event studies. This reinforces the idea that we are measuring the effects of very local labor shocks rather than demand side or general equilibrium effects spilling over from the Norwegian side.[21]

[21] Any such pattern of increased spending would work against the negative effects on Swedish firms we find if demand spillovers from Norway propped up firms in border municipalities.

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 productivity and reducing their workforces. The workers at the affected firms (those not having left for Norway and those potentially being hired after the shock) are of lower average quality, resulting in a drop 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 persist for at least a decade after the initial shock.

We use similar data from the Norwegian side to demonstrate that Norwegian workers are being displaced by Swedish workers. In particular, high-skilled Norwegian labor loses their skill monopoly, an effect driven by the positively selected high-skilled workers from Sweden. This causes wage compression at the top of the income distribution and an improvement in wage equality in the border municipalities on the Norwegian side. We also show that Norwegian firms benefit through cheaper labor costs and higher value-added relative to labor costs, leaving them unambiguously better off than in a world in which they could not take advantage of Swedish labor.

In terms of interpreting our findings and extrapolating to other settings, it is important to note that the increased labor market competition in our study is not caused by a decrease in barriers to competition, but rather through a change in worker outside options. Such changes occur frequently and continuously through a range of different mechanisms – from the construction of transportation links and the establishment of new businesses to changes in exchange rates. Given the dynamic nature of local labor markets and the volatility of market structures to changing economic environments, this is of great independent interest. Specifically, in a world where differences in earnings arise across space and technological and political developments make physical (or virtual) movement across labor markets cheaper, understanding these market forces is essential to both predicting and shaping the future of labor market interactions across space. In addition, it is likely that the direction of effects would be similar if policies more directly decrease barriers to competition through, for example, competition policies or migration policies because they would also affect outside options for workers.

In a time where national competition authorities are pushing for increased labor market compe-

tition across regions, and federal governments are setting up specialized commissions tasked with injecting competition into local labor markets, (e.g., the 2022 Economic Report of the President) it is crucial to understand the effect on not only workers but also on firms and communities. Such knowledge will not only help us understand the wider implications of increased labor competition for communities and social cohesion but also help to predict and shape the future of work in an increasingly connected world. Our setting on the Sweden-Norway border provides a unique opportunity to cleanly isolate and identify the effects of an aspect of labor markets that is relevant across countries and regions. In light of our findings, we see it as a promising avenue for future research to more carefully trace out the consequences of these competition dynamics for individual workers (those who benefit, those who are left behind, and those who move) and its possible spillover effects on family members, not only in terms of labor market outcomes, but also in terms of worker migration patterns, family formation, and children.

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Tables and Figures

Table 1: Sweden Firm Effects

	Panel A		
VARIABLES	(1) Number of Workers	(2) Average Worker Earnings (1,000s SEK)	(3) Value Added (1,000s SEK)
Phase In	-0.280**	-0.234	-258.522***
	(0.127)	(2.171)	(90.164)
Full Exposure	-0.347**	3.579	-333.318***
	(0.175)	(3.302)	(120.094)
Observations	414,644	414,644	414,644
Dependent Variable Mean	5.1	221	2,738

	Panel B		
VARIABLES	(1) Value Added Per Worker (1,000s SEK)	(2) Average Markdown (1,000s SEK)	(3) Pr(Exit)
Phase In	-50.176***	-49.942***	0.000
	(13.723)	(13.894)	(0.002)
Full Exposure	-68.027**	-71.606**	0.008***
	(28.506)	(28.702)	(0.002)
Observations	414,644	414,644	419,157
Dependent Variable Mean	694	474	0.041

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

Table 2: Sweden Firm Effects by Concentration

Panel A

VARIABLES	(1) Number of Workers	(2) Average Worker Earnings (1,000s SEK)	(3) Value Added (1,000s SEK)
Phase In	-0.140	3.59	-165.000*
	(0.146)	(3.661)	(91.702)
Full Exposure	-0.231	6.45	-180.788
	(0.213)	(5.079)	(151.788)
Phase In * HHI	-1.289*	-35.12	-916.373**
	(0.677)	(27.418)	(397.852)
Full Exposure * HHI	-1.162	-28.29	-1445.499**
	(0.867)	(35.746)	(603.282)
Observations	397,373	397,373	397,373
Dependent Variable Mean	5.1	221	2,738

Panel B

VARIABLES	(1) Value Added Per Worker (1,000s SEK)	(2) Average Markdown (1,000s SEK)	(3) Pr(Exit)
Phase In	-11.034	-14.623	0.001
	(22.634)	(23.044)	(0.003)
Full Exposure	-6.294	-12.745	0.003
	(47.531)	(47.804)	(0.003)
Phase In * HHI	-339.815***	-304.694**	-0.015
	(119.073)	(124.503)	(0.015)
Full Exposure * HHI	-540.733**	-512.442**	-0.009
	(257.540)	(261.305)	(0.017)
Observations	397,373	397,373	400,535
Dependent Variable Mean	694	474	0.041

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations of Swedish register data at the firm level.
Notes: Estimates come from Equation 2 but also include interactions with a firm's 2004 average HHI. Estimates include fixed effects for firm, municipality, and year. Standard errors clustered at the firm level.

Table 3: Sweden Municipality Effects

	Panel A		
VARIABLES	(1) 90/10 Gap (1,000s)	(2) 90/50 Gap (1,000s)	(3) 50/10 Gap (1,000s)
Phase In	124.90***	10.689***	1.801
	(3.683)	(3.016)	(2.119)
Full Exposure	22.191***	16.004***	6.186*
	(5.427)	(4.223)	(3.201)
Observations	967	967	967
Dependent Variable Mean	361.81	145.67	216.13
	Panel B		
VARIABLES	(1) Firms with 3+ Workers	(2) Population	(3) Tax Revenue (1,000s)
Phase In	-13.897***	-149.491*	-110655.769***
	(3.815)	(86.707)	(30917.006)
Full Exposure	-26.004***	-556.771**	-196868.564***
	(6.514)	(219.210)	(53.695)
Observations	967	967	962
Dependent Variable Mean	156.635	11,974	871,737
	Panel C		
VARIABLES	(1) Social Support Equalization (1,000s)	(2) Tax Revenue Per Capita (1,000s)	(3) SS and E Per Capita (1,000s)
Phase In	-37324.566***	-0.524	0.369
	(11402.451)	(0.804)	(1.031)
Full Exposure	-74894.972***	-2.078*	1.416
	(22943.724)	(1.152)	(1.547)
Observations	962	962	962
Dependent Variable Mean	199,208	75.914	21.48
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

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 4: Norway Firm Effects

	Panel A		
VARIABLES	(1) Domestic Workers	(2) Total Personnel Costs (1,000 NOK)	(3) Value Added (1,000 NOK)
Phase In	-0.305	-301.4	-369.1
	(0.204)	(196.8)	(265.3)
Full Exposure	-0.884**	-810.3**	-260.6
	(0.353)	(382.9)	(610.2)
Observations	260,622	260,622	260,622
Dependent Variable Mean	8.5	5,470	5,892

	Panel B		
VARIABLES	(1) Value Added Per Domestic Worker (1,000 NOK)	(2) Value Added Per NOK in Personnel Costs	(3) Personnel Share of Total Costs
Phase In	-0.00343	0.000759	-0.00404**
	(20.24)	(0.0154)	(0.00202)
Full Exposure	36.54*	0.0347*	-0.00467*
	(19.96)	(0.0203)	(0.00280)
Observations	260,622	258,749	260,379
Dependent Variable Mean	514	1.1470	0.3594

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

Table 5: Norway Firm Effects by Concentration

Panel A

VARIABLES	(1) Domestic Workers	(2) Total Personnel Costs (1,000 NOK)	(3) Value Added (1,000 NOK)
Phase In	-0.168	-312.0	-581.6**
	(0.244)	(238.6)	(267.9)
Full Exposure	-0.590	-999.5**	-513.9
	(0.402)	(465.4)	(872.9)
Phase In * HHI	-0.429	859.6	1,705
	(1.911)	(1,163)	(2,014)
Full Exposure * HHI	-3.004	372.6	1,886
	(3.478)	(2,667)	(5,085)
Observations	190,940	190,940	190,940
Dependent Variable Mean	8.5	5,470	5,892

Panel B

VARIABLES	(1) Value Added Per Domestic Worker (1,000 NOK)	(2) Value Added Per NOK in Personnel Costs	(3) Personnel Share of Total Costs
Phase In	-4.817	-0.0345*	0.00307
	(21.34)	(0.0198)	(0.00243)
Full Exposure	-8.724	-0.00332	0.00392
	(20.57)	(0.0281)	(0.00387)
Phase In * HHI	63.15	0.223**	-0.0450***
	(55.27)	(0.0875)	(0.0111)
Full Exposure * HHI	191.1**	0.224*	-0.0499***
	(93.09)	(0.124)	(0.0172)
Observations	190,940	189,883	190,835
Dependent Variable Mean	514	1.147	0.3594

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

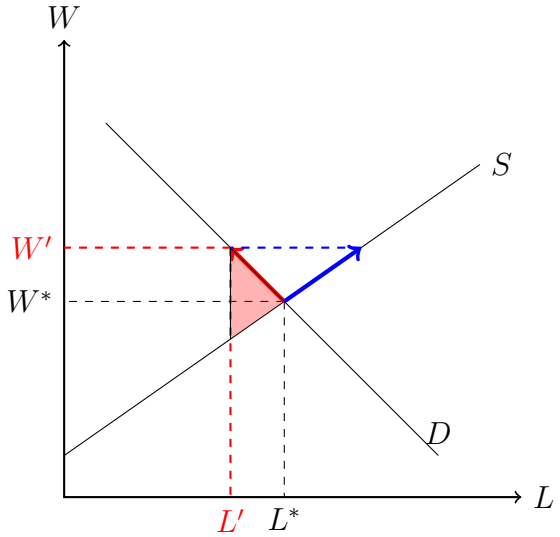
Table 6: Norway Municipality Effects

	Panel A		
	(1)	(2)	(3)
VARIABLES	90th Pctile	50th Pctile	10th Pctile
Phase In	-6,897**	-2,833**	-1,691
	(2,649)	(1,084)	(1,414)
Full Exposure	-13,301**	-2,932	351.4
	(5,738)	(2,665)	(2,166)
Observations	1,316	1,316	1,316
Dependent Mean	511,793	333,814	179,134
	Panel B		
	(1)	(2)	(3)
VARIABLES	90/10 Gap	90/50 Gap	50/10 Gap
Phase In	-5,206*	-4,064	-1,142
	(2,977)	(2,596)	(1,569)
Full Exposure	-13,653**	-10,369**	-3,284
	(5,638)	(3,988)	(2,746)
Observations	1,316	1,316	1,316
Dependent Mean	332,659	177,979	154,680
	Panel C		
	(1)	(2)	(3)
VARIABLES	Number of Firms	Number of Workers	Population
Phase In	-1.955	-67.38	30.31
	(4.418)	(64.07)	(153.9)
Full Exposure	-6.174	-141.3	54.21
	(6.452)	(118.3)	(370.9)
Observations	1,316	1,316	1,316
Dependent Mean	196	3,814	10,704
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

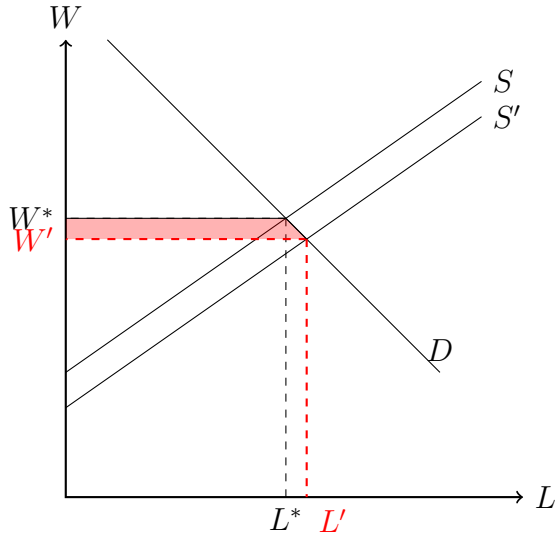
Source: Authors' calculations of Norwegian register data at the municipality level.
Notes: Estimates come from Equation 2 and include fixed effects for municipality and year. Standard errors clustered at the municipality level.

Figure 1: Frameworks for a Change in Outside Options

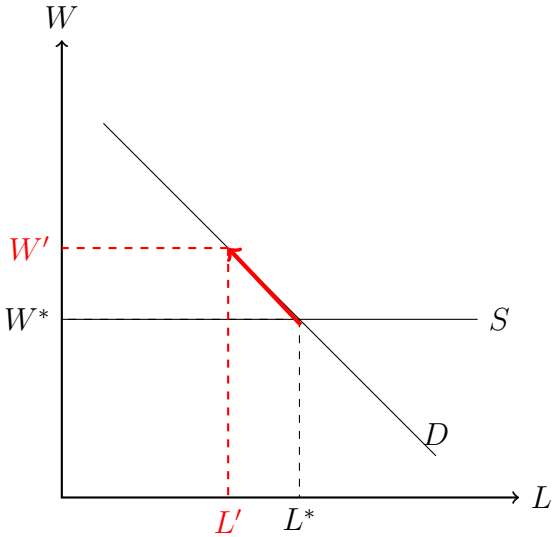
Panel A: Market-Level Change in Outside Option



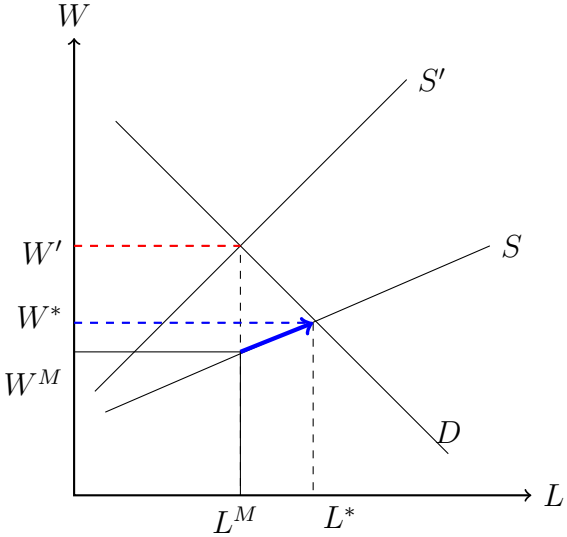
Panel B: New Market Influx of Workers



Panel C: Competitive Firm with New Competition



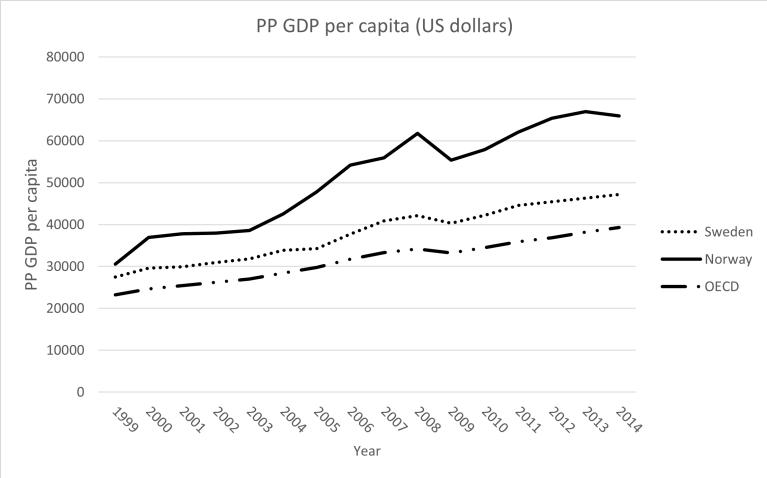
Panel D: Monopsonistic Firm with New Competition



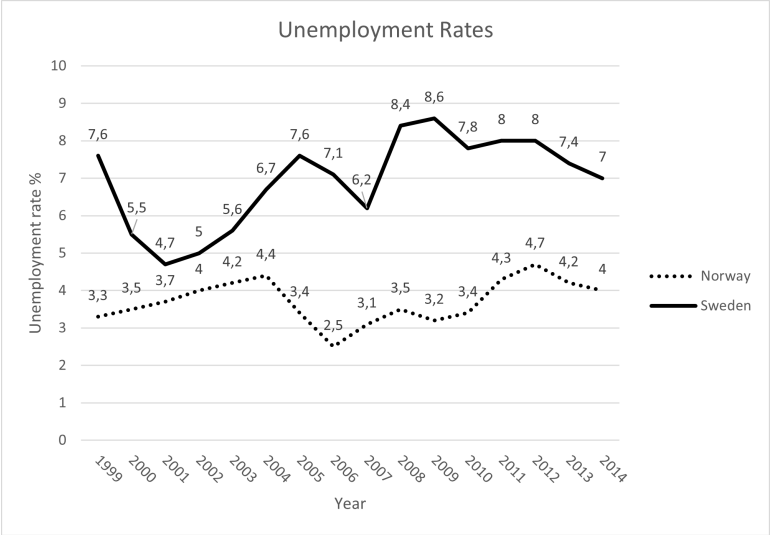
Source: Authors' illustration of the introduction of a new wage through an outside option in the overall labor market (Panel A), the shift in labor supply to the new market (Panel B), firm-level responses to a higher wage in a competitive firm (Panel C), and in a monopsonistic firm (Panel D).

Figure 2: Drivers of Commuting Pressure

Panel A: GDP Growth

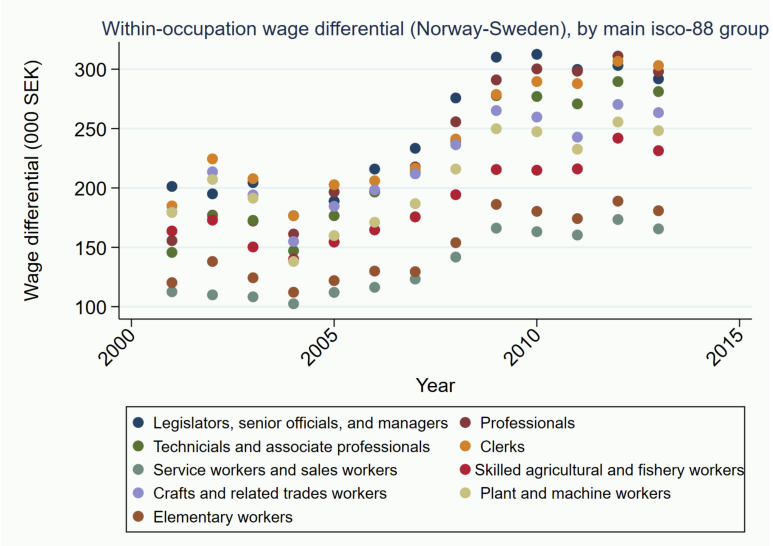


Panel B: Unemployment Rates



Panel C: Average Within-Occupation Earnings Gap

Panel D: Occupation Earnings Gaps by Industry

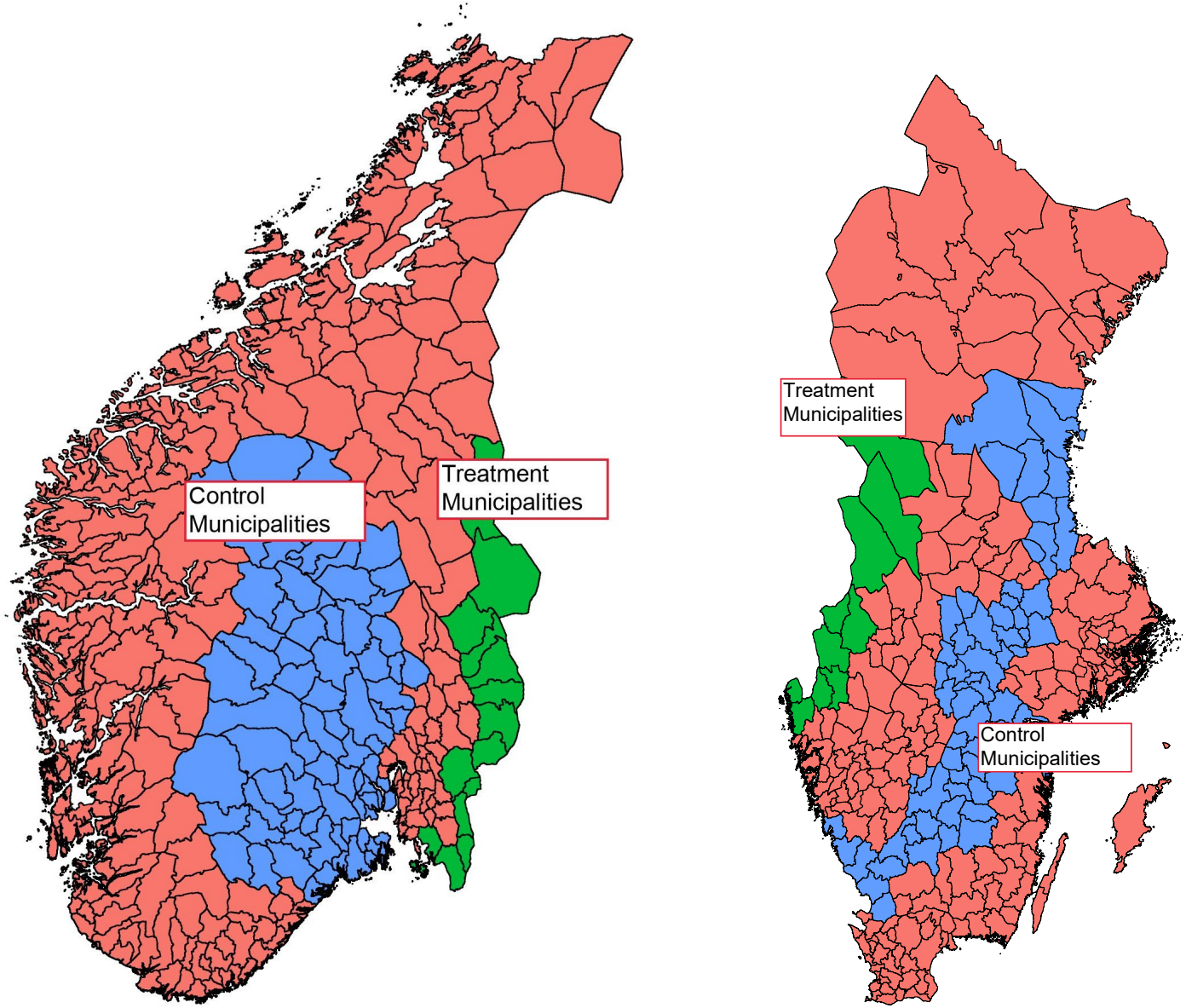


Source: OECD (Panels A and B) and authors' calculations of Norwegian and Swedish register data (Panels C and D).
Notes: Panels C and D adjust are adjusted for contemporaneous exchange rates.

Figure 3: Treatment and Control Groups

Panel A: Norway Side

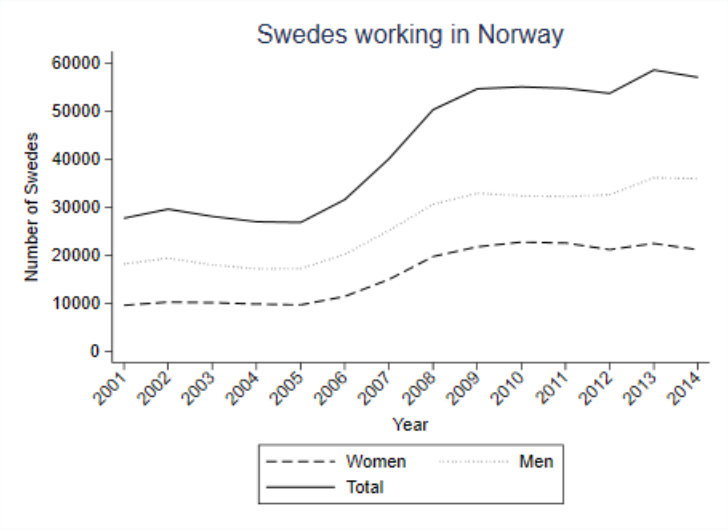
Panel B: Sweden Side



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.

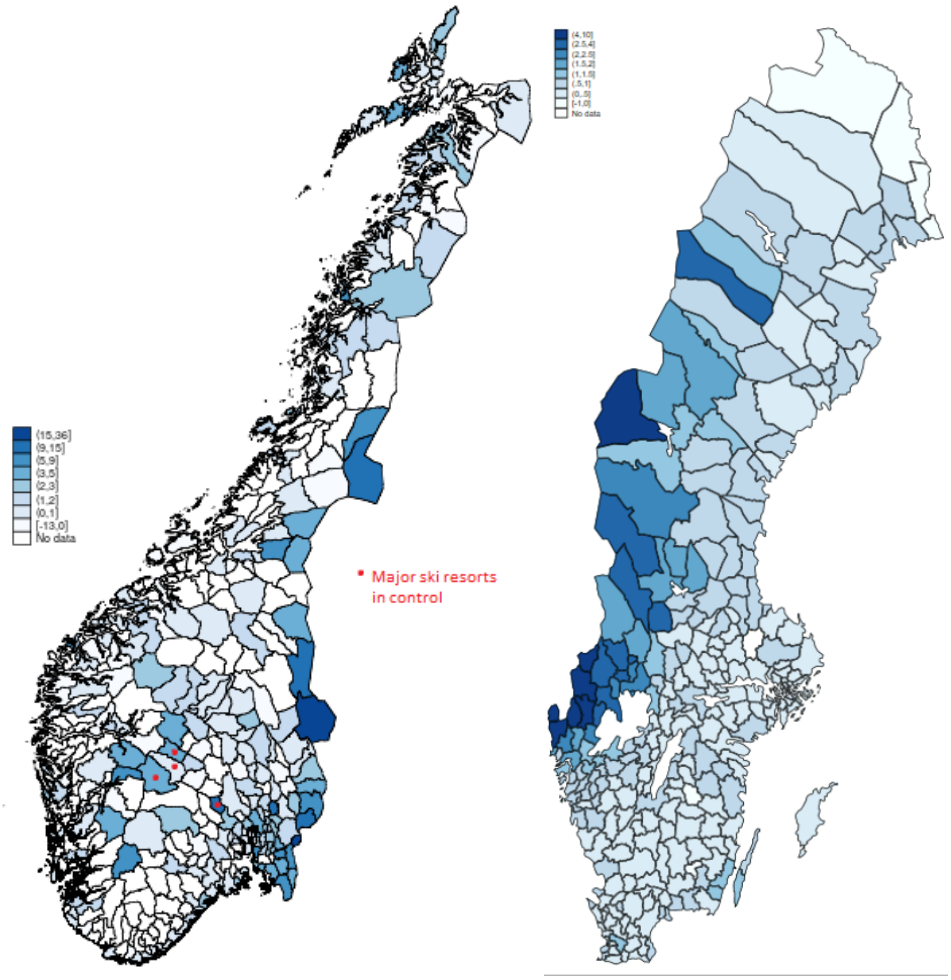
Figure 4: Commuting Patterns

Panel A: Rise in Total Cross-Border Commuters



Panel B: Change in Share Swedish Commuters

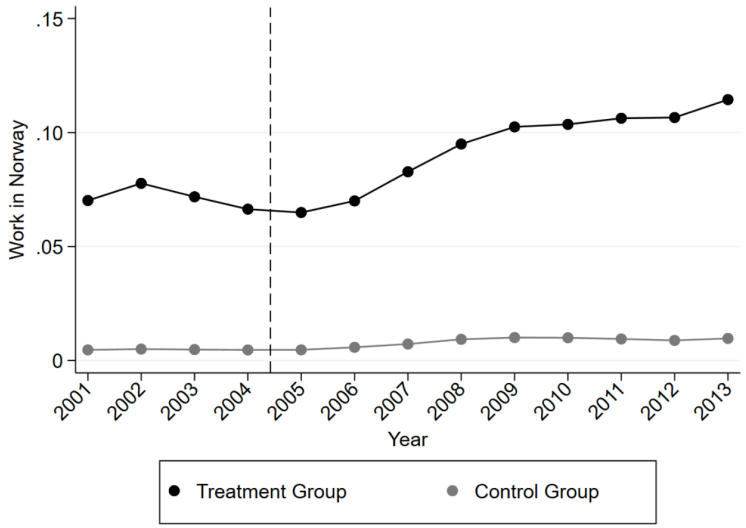
Panel C: Change in Share Commuting



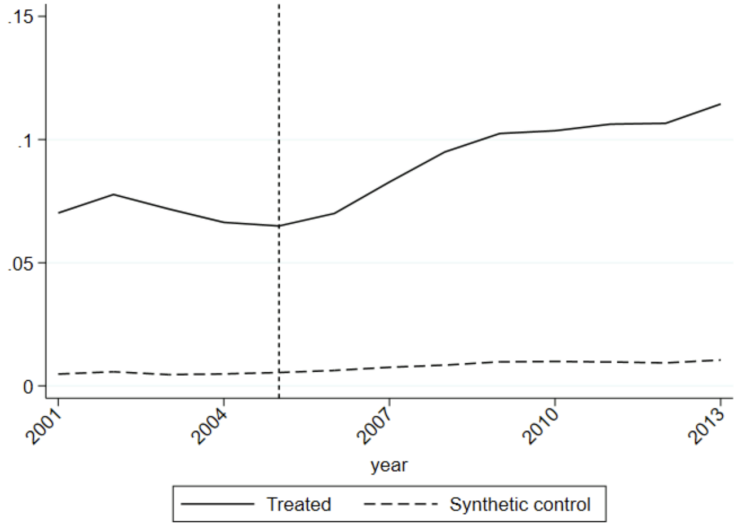
Source: Authors' calculations of Norwegian and Swedish register data.
Notes: Commuter shares are calculated among all employed workers in our samples in base year 2005. Changes are for the 2005 to 2013 period.

Figure 5: Validating the Local Commuting Shock

Panel A: Pr(Work in Norway); Raw trends



Panel B: Pr(Work in Norway); Synthetic control

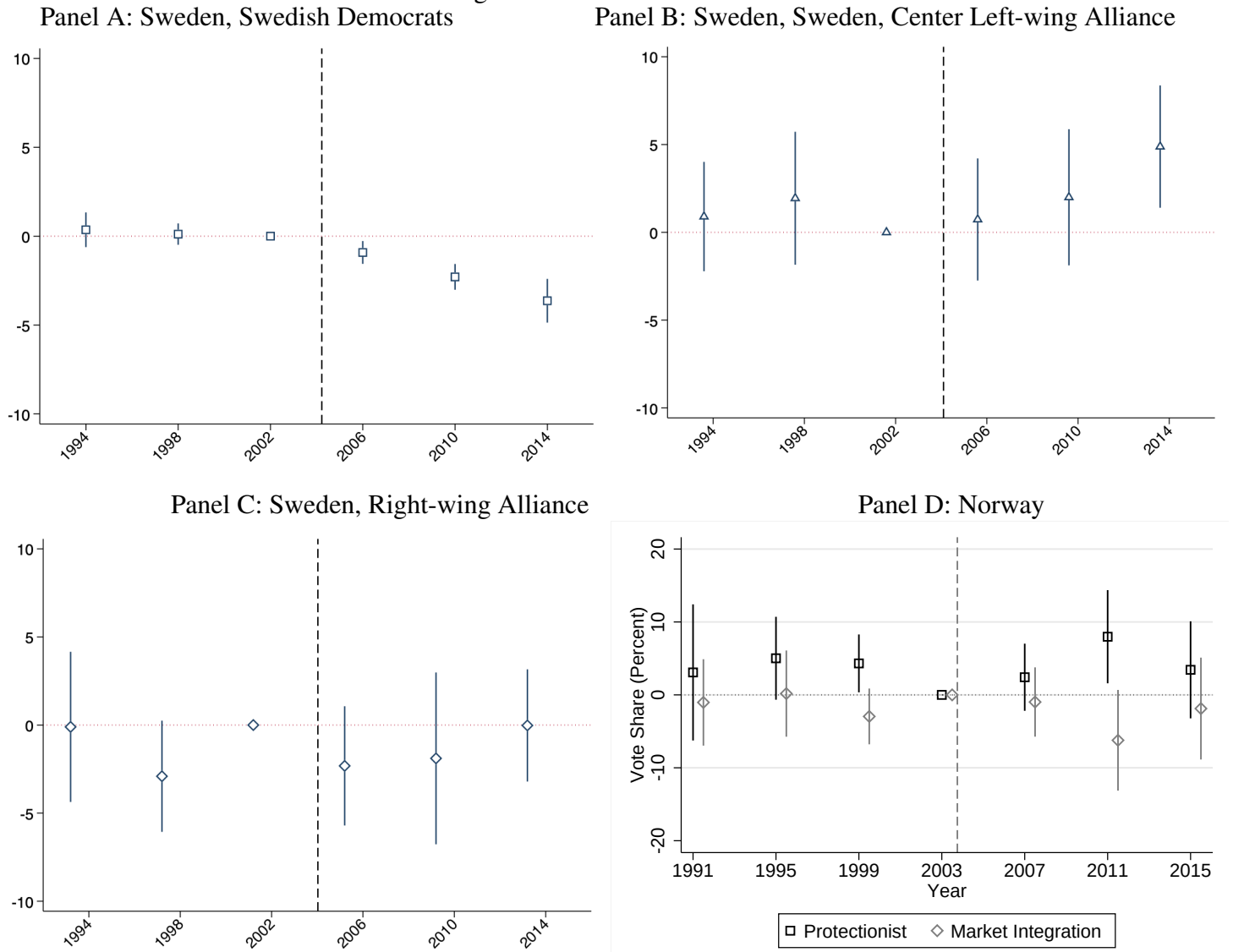


Panel C: Difference-in-Differences

VARIABLES	(1) Pr(Work in Norway)	(2) Avg Earnings in Norway (SEK)	(3) Avg Total Earnings (SEK)
Phase In	0.013***	9654.708***	4748.079**
	(0.003)	(2142.143)	(2018.258)
Full Exposure	0.032***	19099.008***	9578.813***
	(0.005)	(3789.474)	(3236.955)
Observations	11,578,797	11,578,797	11,578,797
Dependent Variable Mean	0.012	2,521	203,801

Source: Authors' calculations of Swedish and Norwegian register data.
Notes: Panel A comes from Equation 1 at the individual level. Panel B is constructed using a synthetic control approach we describe in Section 7 in which we match synthetic donor municipalities with our treated municipalities on labor market and demographic variables. Panel C comes from Equation 2, where the phase-in period is 2005-2009, and the full exposure period is 2010-2014. Standard errors are in parenthesis and are clustered at the municipality level.

Figure 6: Political Outcomes



Source: Authors' calculations of municipality voter data in Sweden and Norway.
Notes: Estimates come from Equation 1 relative to base years 2002 (Sweden) and 2003 (Norway). In Panels A-C, "Right Wing" consists of Moderaterna, Liberalerna, Kristdemokraterna, and Centerpartiet; the Left Wing consists of Socialdemokraterna, Vansterpartiet, and Miljopartiet. In Panel D, Protectionist parties opposed to EU integration include Senterpartiet (Centre Party), Kristelig Folkeparti (Christian Democrats), Sosialistisk Venstreparti (Socialist Left), and Fremskrittspartiet (Progress Party); Market Integration parties support EU integration and include Venstre (Liberal), Høyre (Conservative), and Arbeiderpartiet (Labour) parties.

A Online Appendix (not for publication)

Table A1: Sample Summary Statistics - Sweden

	Panel A: Individual Outcomes			
	(1)	(2)	(3)	(4)
	Treatment		Control	
	Mean	SD	Mean	SD
% Working in Norway	0.09	0.28	0.01	0.08
Annual Earnings (1,000s SEK)	198.28	153.61	204.12	16903
Individual Observations	627,661		10,951,136	

	Panel B: Firm Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Number of Workers	5.06	20.25	6.51	27.47
Average Worker Earnings (1,000s)	220.50	181.13	212.94	158.27
Firm Value-Added (1,000s)	2,737.50	13,265.18	3,722.72	23,700.43
Firm Value-Added per Worker (1,000s)	694.16	1,299.79	850.38	1,956.09
Markdowns (1,000s)	473.65	1,313.53	637.44	1,961.93

	Panel C: Municipality Outcomes			
	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
90th Percentile (1,000s)	364.87	57.21	361.53	48.11
50th Percentile (1,000s)	211.33	30.34	217.08	28.79
10th Percentile (1,000s)	0.00	0.00	201.08	1,385.27
Population	4,828.16	2,360.23	13,083.79	16,977.10
Tax Revenue per Capita (1,000s)	72.93	10.63	76.38	11.90
Social Support Equal. per Capita (1,000s)	30.32	10.63	20.10	7.27
Number of Firms (3+ workers)	63.18	31.64	170.67	221.19

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

Table A2: Sample Summary Statistics - Norway

Panel A: Individual Outcomes

	(1)	(2)	(3)	(4)
	Treatment		Control	
	Mean	SD	Mean	SD
% Workers Commuters	0.11	0.086	0.02	0.032
Annual Earnings (NOK)	359,854.70	185969.8	376,361.20	229115.4
Individual Observations	856,781		4,521,455	

Panel B: Firm Outcomes

	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
Number of Workers	8.23	22.49	8.53	26.54
Total Personnel Costs (1,000s)	5,193.72	42,084.08	5,517.59	42,841.74
Firm Value-Added (1,000s)	5,612.82	63,978.63	5,940.01	71,395.40
Firm Value-Added per (Domestic) Worker (1,000s)	494.26	1,170.32	517.45	2,288.22

Panel C: Municipality Outcomes

	Treatment		Control	
VARIABLES	Mean	SD	Mean	SD
90th Percentile	490,597.70	94,216.70	515,817.50	107,723.30
50th Percentile	328,092.80	59,601.89	334,900.10	61,316.33
10th Percentile	179,766.20	37,001.68	179,013.80	34,707.83
Population	11,471.85	13,125.55	10,557.83	12,258.94
Number of Firms (3+ workers)	193.57	219.19	196.45	251.63

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

Table A3: Summary Statistics - Swedish Commuters vs Non-Commuters in Sample

	(1)	(2)	(3)	(4)
	Commuters		Non-Commuters	
	Mean	SD	Mean	SD
With Children Under 18	0.38	0.48	0.46	0.5
Age	36.66	10.37	38.99	10.35
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	49,799.66	105,360.55	184,234.23	139,889.71
Female	0.28	0.45	0.5	0.5
Married	0.25	0.44	0.32	0.47
Employed in Sweden	0.38	0.49	0.84	0.36
Total Earnings	346,036.53	205,086.14	184,234.23	139,889.71

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

Table A4: Effects on Probability of Working in Norway, by Industry

Panel A

VARIABLES	(1) Agriculture, hunting, and forestry	(2) Fishing	(3) Mining and quarrying except energy producing materials	(4) 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

Panel B

VARIABLES	(1) Electricity, gas and water supply	(2) Construction	(3) Wholesale and retail trade	(4) 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

Panel C

VARIABLES	(1) Transport, storage and communication	(2) Financial intermediation	(3) Real estate, renting and business activities	(4) Public administration and defence
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

Panel D

VARIABLES	(1) Education	(2) Health and social work	(3) Other community, Social and personal service activities	(4) 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 A5: Sweden Firm Effects, Omitting Firm Fixed Effects

	Panel A		
VARIABLES	(1) Number of Workers	(2) Average Worker Earnings (SEK)	(3) Value Added (1000s SEK)
Phase In	-0.696***	2.381	-497.760***
	(0.189)	(2.743)	(105.145)
Full Exposure	-1.661***	9.122**	-2035.804***
	(0.247)	(3.637)	(190.611)
Observations	419,157	419,157	419,157
Dependent Variable Mean	5.1	221	2,738

	Panel B	
VARIABLES	(1) Value Added Per Worker (1000s SEK)	(2) Average Markdown (1000s SEK)
Phase In	-101.490**	-103.871**
	(46.331)	(46.440)
Full Exposure	-332.277***	-341.399***
	(54.750)	(54.916)
Observations	419,157	419,157
Dependent Variable Mean	694.16	473.65

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

Table A6: Sweden: Local Services Revenue and House Prices

VARIABLES	(1) Total Revenue in Local Goods (1,000 SEK)	(2) Average House Price (1,000 SEK)
Phase In	-185.448	-0.649
	(334.167)	(67.714)
Full Exposure	56.306	57.955
	(679.005)	(126.877)
Observations	967	962
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

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 A7: Sweden Firm Effects in the Tradable Sector

	Panel A		
VARIABLES	(1) Number of Workers	(2) Average Worker Earnings (1,000s SEK)	(3) Value Added (1,000s SEK)
Phase In	-0.213	5.369*	-241.321
	(0.218)	(3.028)	(156.595)
Full Exposure	-0.344	11.05**	-420.643**
	(0.295)	(4.696)	(177.451)
Observations	171,723	171,723	171,723

	Panel B	
VARIABLES	(1) Value Added Per Worker (1,000s SEK)	(2) Average Markdown (1,000s SEK)
Phase In	-40.497***	-45.865***
	(14.969)	(15.240)
Full Exposure	-67.530***	-78.582***
	(26.058)	(26.506)
Observations	171,723	171,723
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

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

Table A8: Synthetic Control Estimates of Commuting

VARIABLES	(1) Share Working in Norway	(2) Avg Earnings in Norway (SEK)	(3) Avg Total Earnings (SEK)
Phase In	0.015	9869.513	5837.377
Full Exposure	0.034	19573.052	12695.401

Source: Authors' calculations of Swedish register data.
Notes: Estimates come from the synthetic control approach in Section 7.

Table A9: Synthetic Control Estimates of Firm-Level Outcomes

Panel A

VARIABLES	(1) Number of Workers	(2) Average Worker Earnings (1,000s SEK)	(3) Value Added (1,000s SEK)
Phase In	-0.664	0.690	-617.479
Full Exposure	-1.465	6.549	-1379.434

Panel B

VARIABLES	(1) Value Added Per Worker (1,000s SEK)	(2) Average Markdown (1,000s SEK)
Phase In	-64.142	-64.832
Full Exposure	-139.679	-146.227

Source: Authors' calculations of Swedish register data.
Notes: Estimates come from the synthetic control approach in Section 7

Table A10: Synthetic Control Estimates of Municipality-Level Outcomes

Panel A

VARIABLES	(1) 90/10 Gap (1,000s)	(2) 90/50 Gap (1,000s)	(3) 50/10 Gap (1,000s)
Phase In	13.310	1.380	-0.494
Full Exposure	23.366	19.473	3.893

Panel B

VARIABLES	(1) Firms with 3+ Workers	(2) Population	(3) Tax Revenue (1,000s)
Phase In	-5.873	-47.481	-34761.589
Full Exposure	-10.349	-176.069	-67072.668

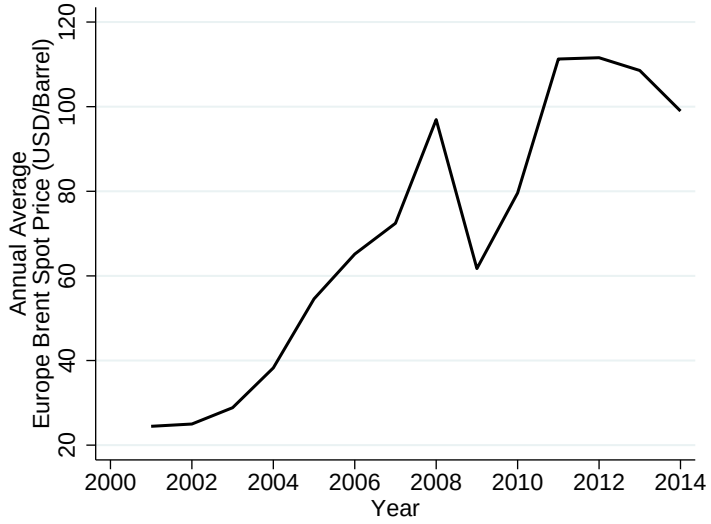
Panel C

VARIABLES	(1) Social Support Equalization (1,000s)	(2) Tax Revenue Per Capita (1,000s)	(3) SS and E Per Capita (1,000s)
Phase In	-17086.194	-0.369	-0.664
Full Exposure	-30330.233	-2.649	-0.516

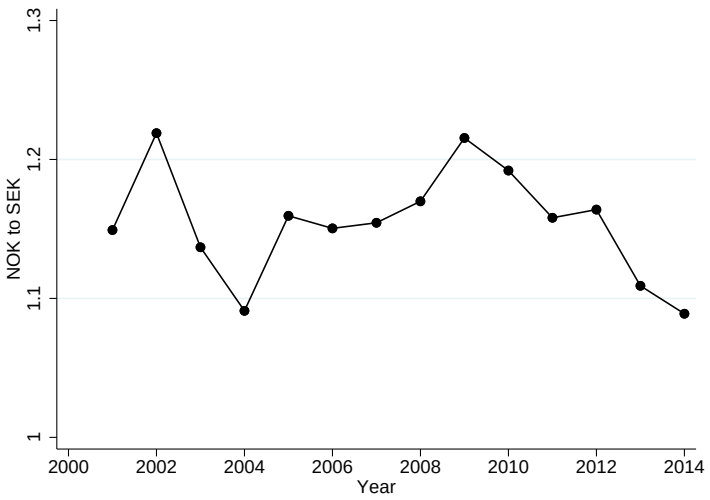
Source: Authors' calculations of Swedish register data.
Notes: Estimates come from the synthetic control approach in Section 7.

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

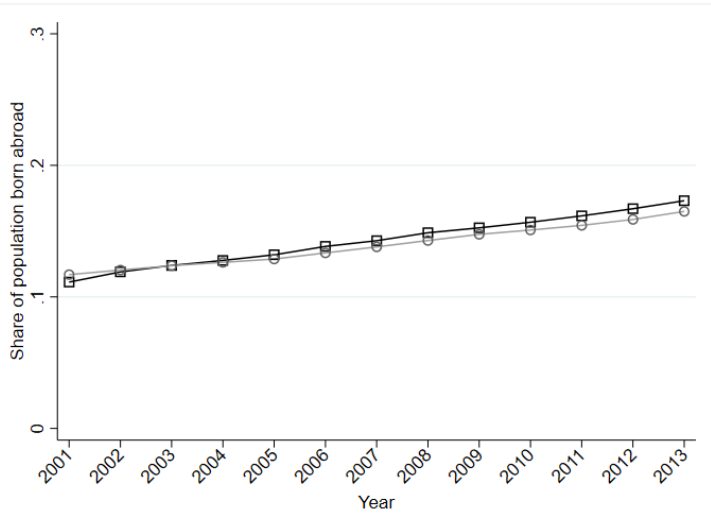
Panel A: Oil Prices in Europe



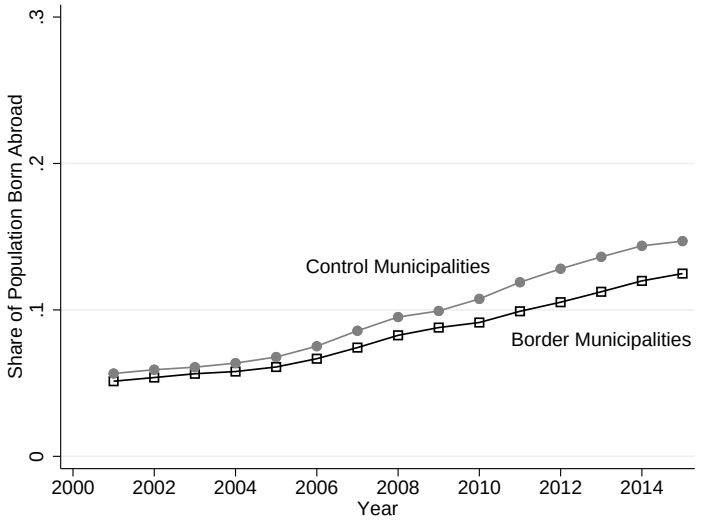
Panel B: NOK to SEK Exchange Rate



Panel C: Sweden Foreign-Born Share

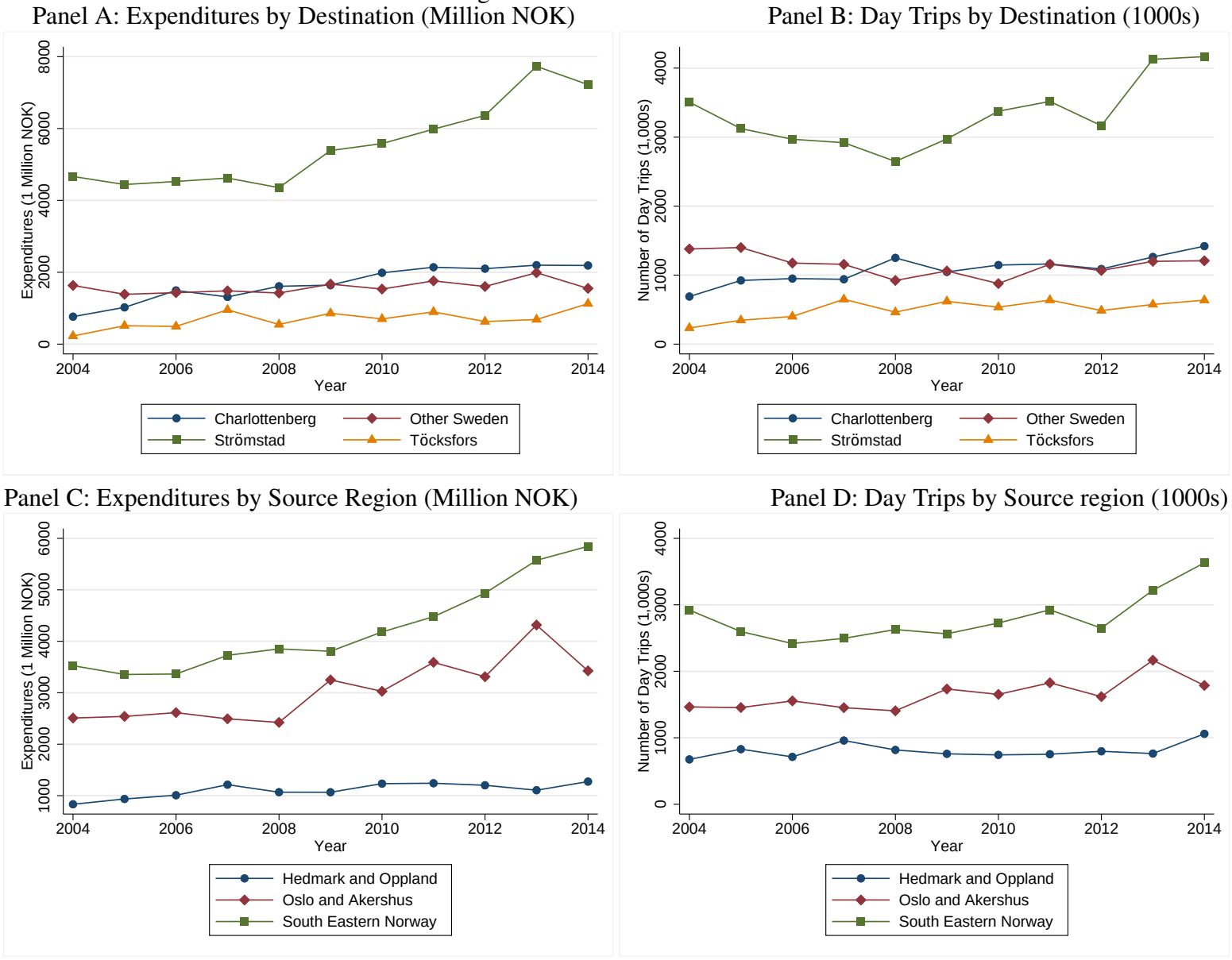


Panel D: Norway Foreign-Born Share



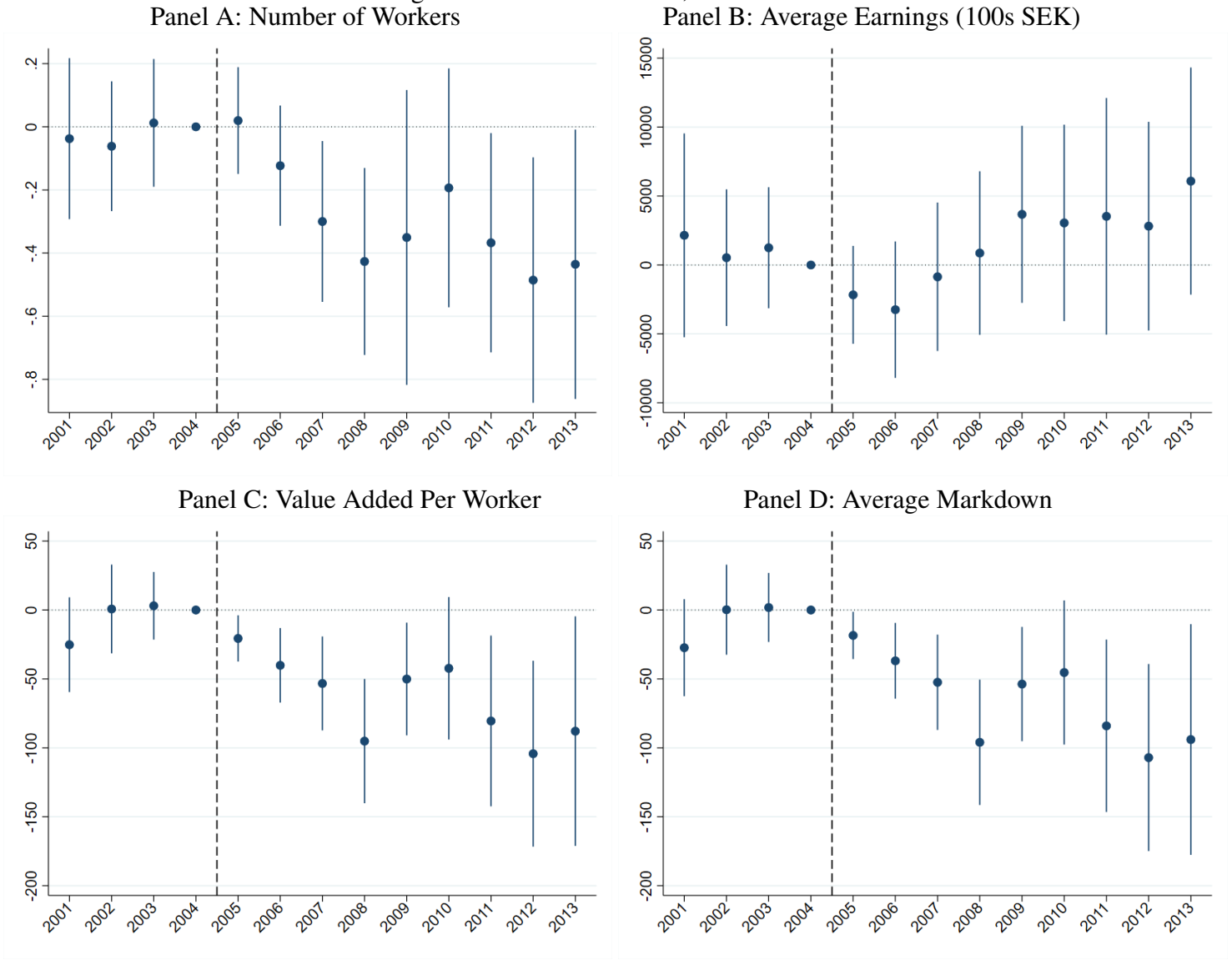
Source: Authors' calculations of register data from Sweden and Norway, US Energy Information Administration (oil prices) and Norges Bank (exchange rates).
Notes: Line depicts the annual average of Europe Brent spot prices in Panel A. Panel B line reflects the annual average exchange rate.

Figure A2: Cross-Border Trade



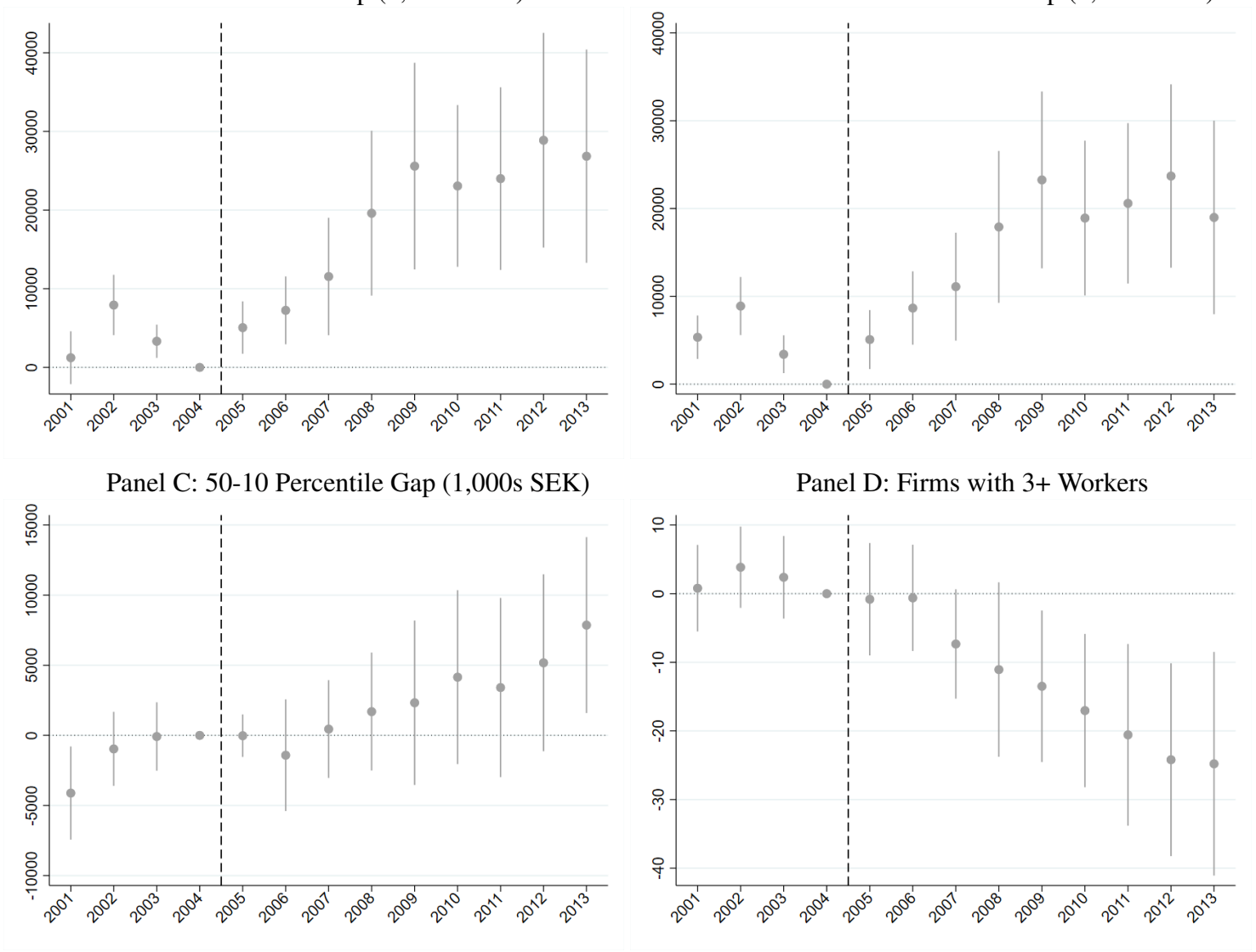
Source: Statistics Norway's quarterly cross-border trade survey for trips taken without accommodations including business and leisure purposes.
Notes: Panels A and B are for specific destination municipalities on the Swedish side of the border. Panels C and D are for regions in Norway from which cross-border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

Figure A3: Sweden - Firms, Event Studies



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

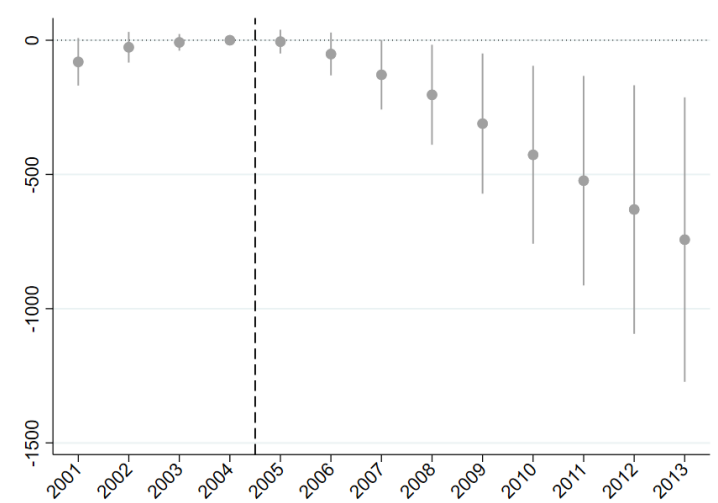
Figure A4: Sweden - Municipalities, Event Studies for Inequality and Firms



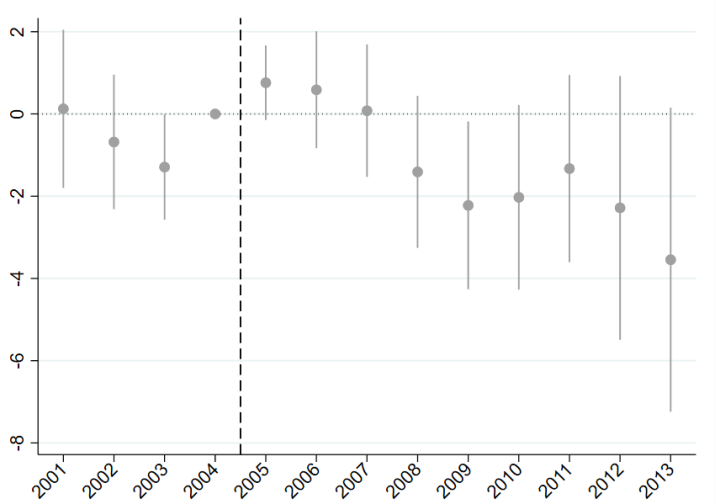
Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure A5: Sweden - Municipalities, Event Studies for Population and Taxes/Transfers

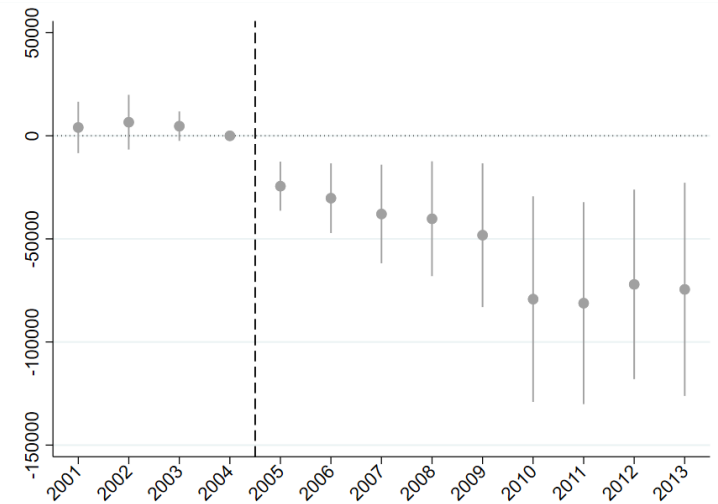
Panel A: Population



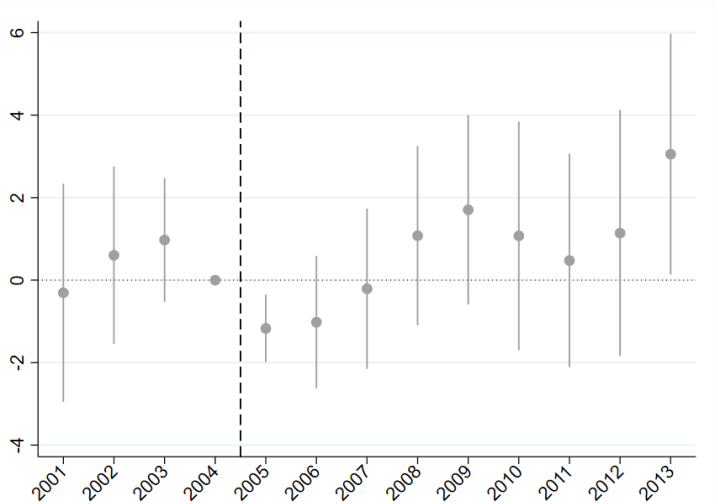
Panel B: Tax Revenue Per Capita



Panel C: Social Support Equalization

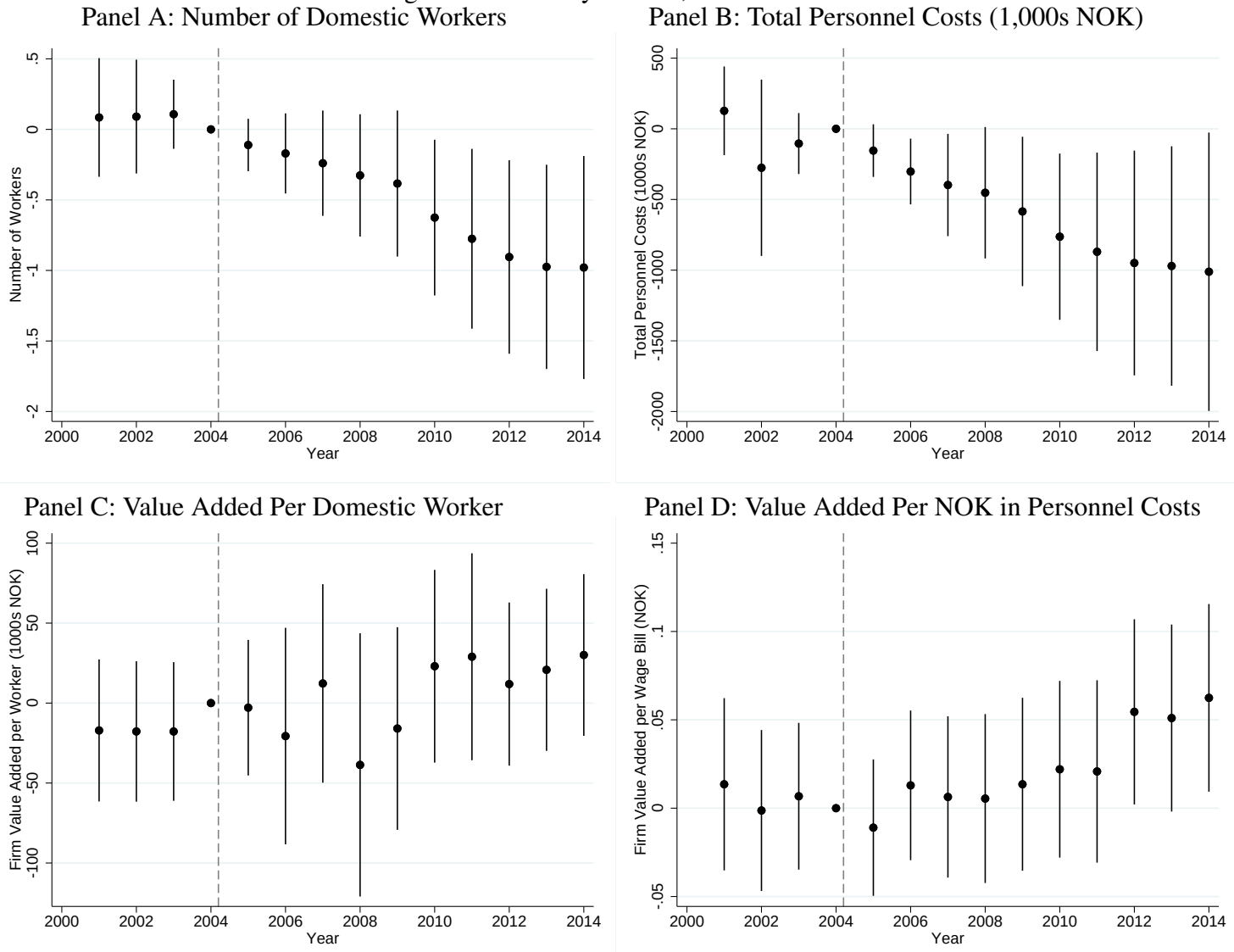


Panel D: Social Support Equalization Per Capita



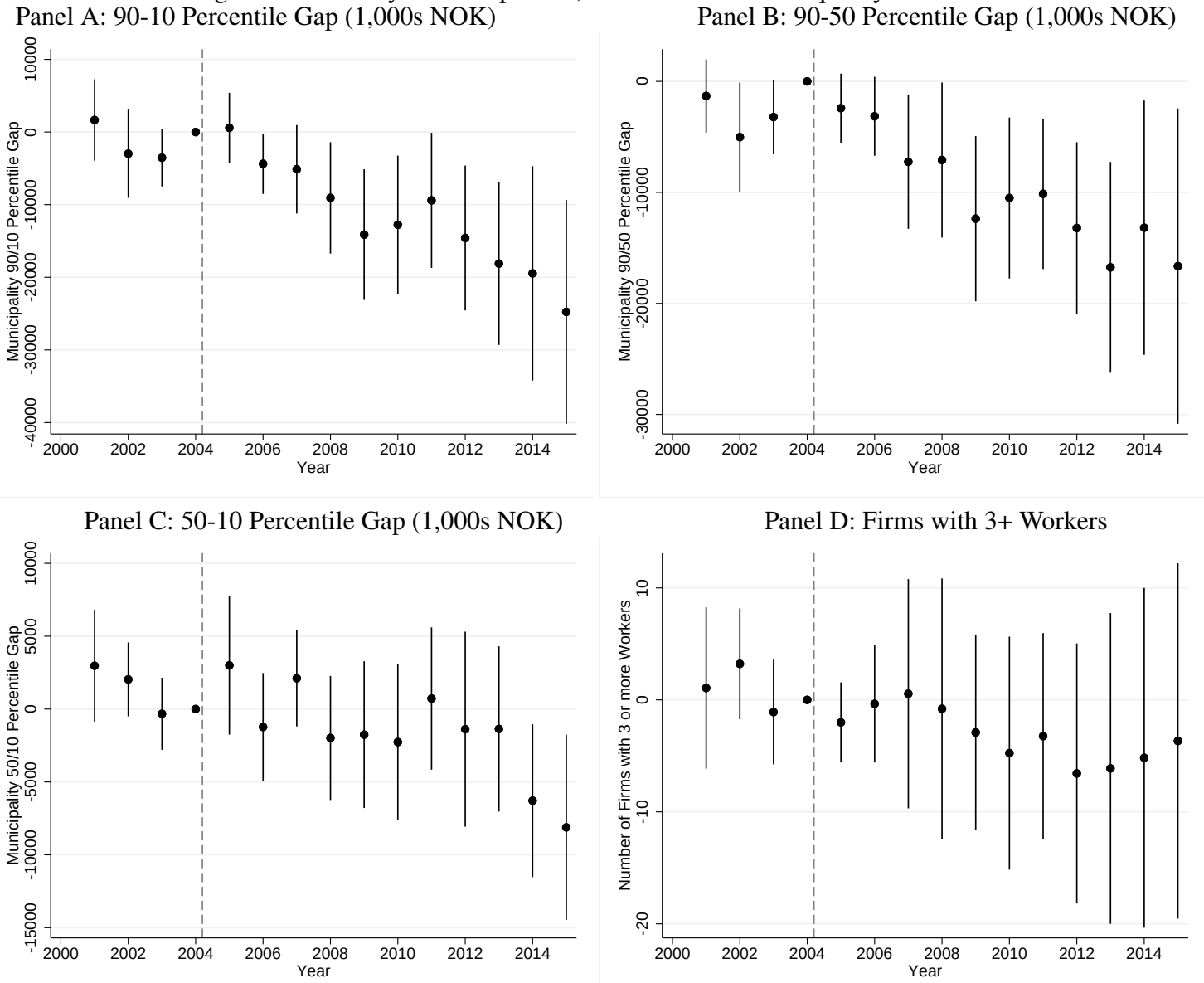
Source: Authors' calculations of Swedish register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure A6: Norway - Firms, Event Studies



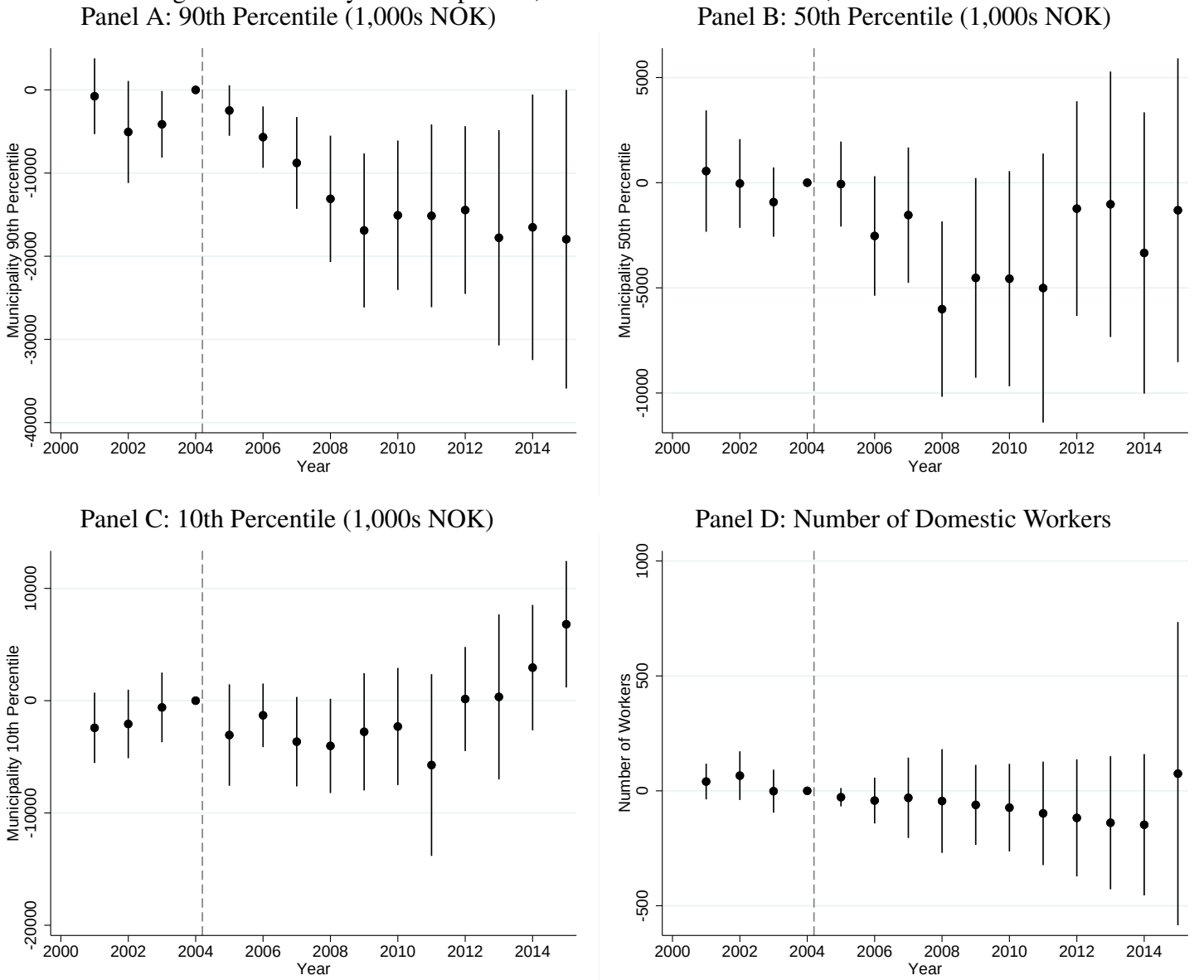
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for firm, municipality, and year. Bars represent 95% confidence intervals. Standard errors clustered at the firm level.

Figure A7: Norway - Municipalities, Event Studies for Inequality and Firms



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.

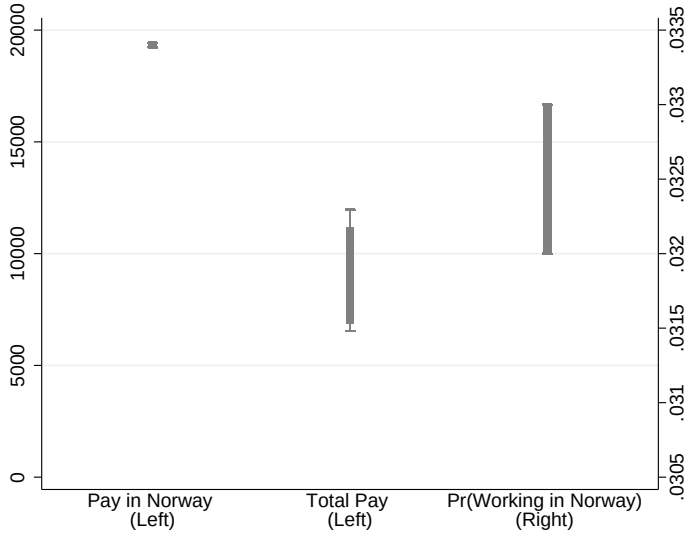
Figure A8: Norway - Municipalities, Event Studies for Workers, Income Percentiles



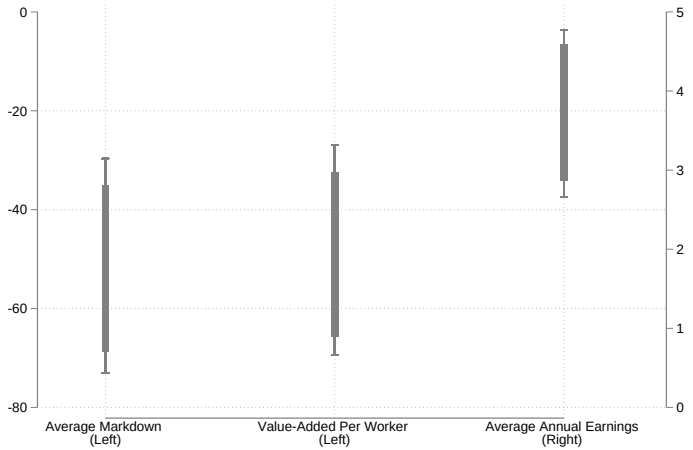
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients from Equation 1. Estimates include fixed effects for municipality and year. Bars represent 95% confidence intervals. Standard errors clustered at the municipality level.

Figure A9: Sweden: Random Control Permutations

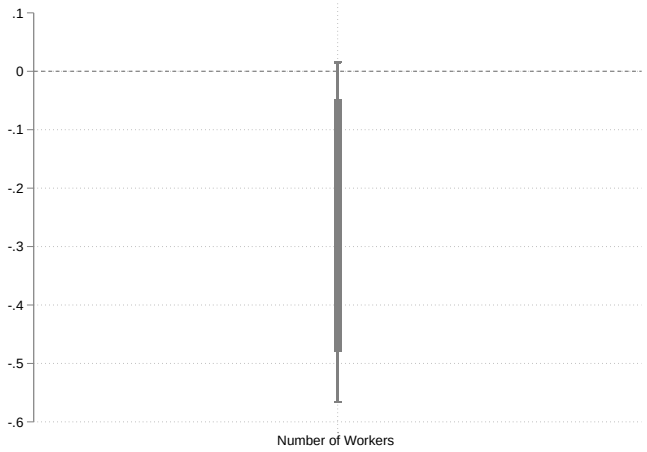
Panel A: Individuals



Panel B: Firms - Value Added and Markdowns



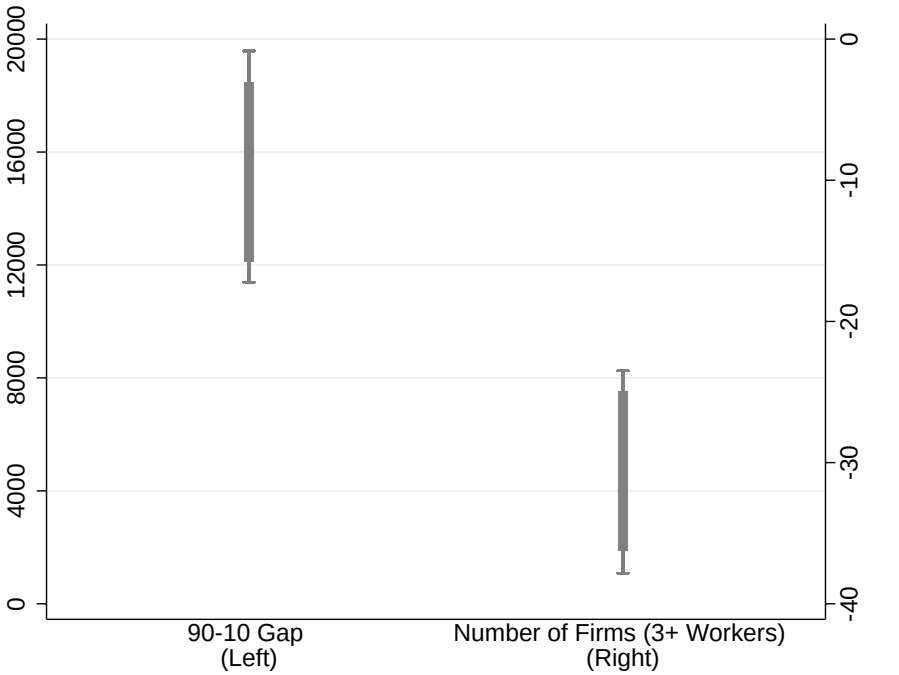
Panel C: Firms - Number of Workers



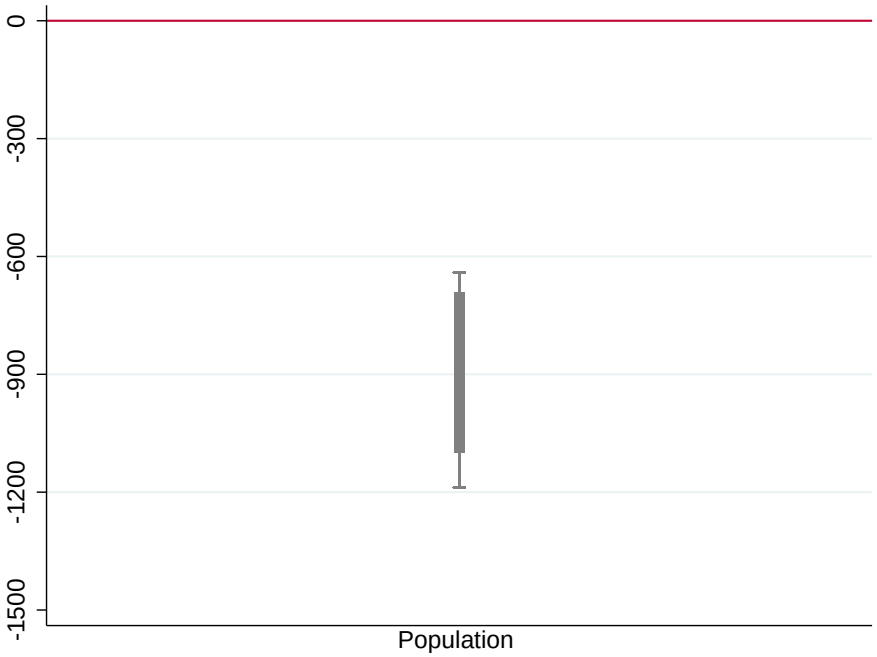
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Thick lines represent the 10th and 90th percentiles of the distribution of coefficients. Caps represent the 5th and 95th percentiles of the distribution of coefficients.

Figure A10: Sweden Municipalities: Random Control Permutations

Panel A: 90-10 Gap and Number of Firms



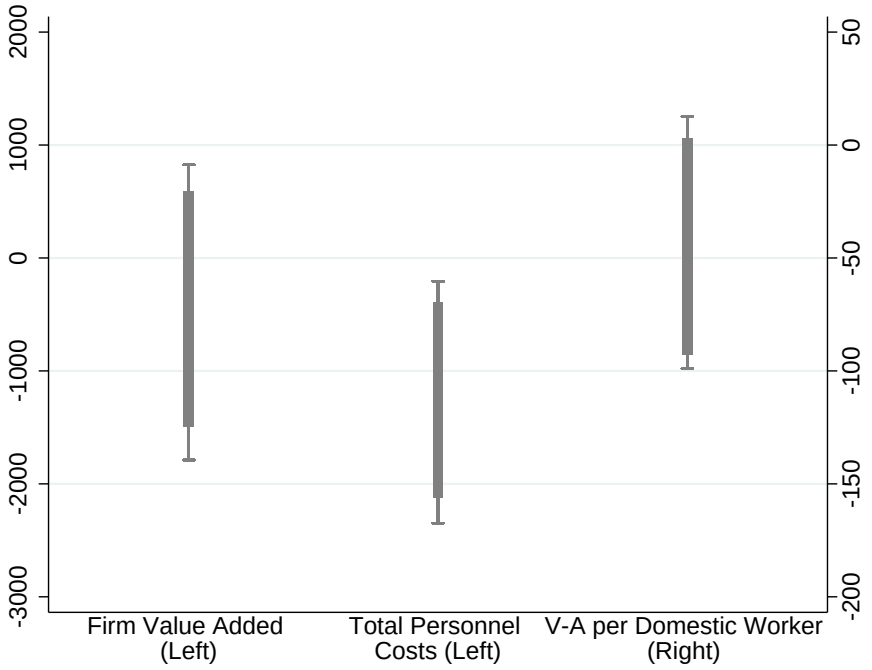
Panel B: Population



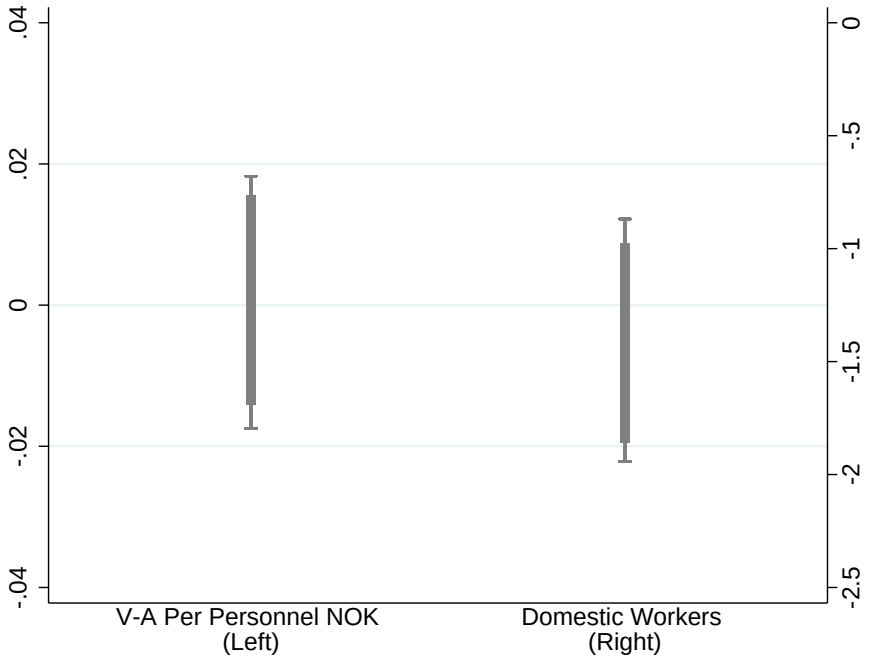
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Thick lines represent the 10th and 90th percentiles of the distribution of coefficients. Caps represent the 5th and 95th percentiles of the distribution of coefficients.

Figure A11: Norway Firms: Random Control Permutations

Panel A: Value Added and Personnel Costs (1,000s), V-A per Worker



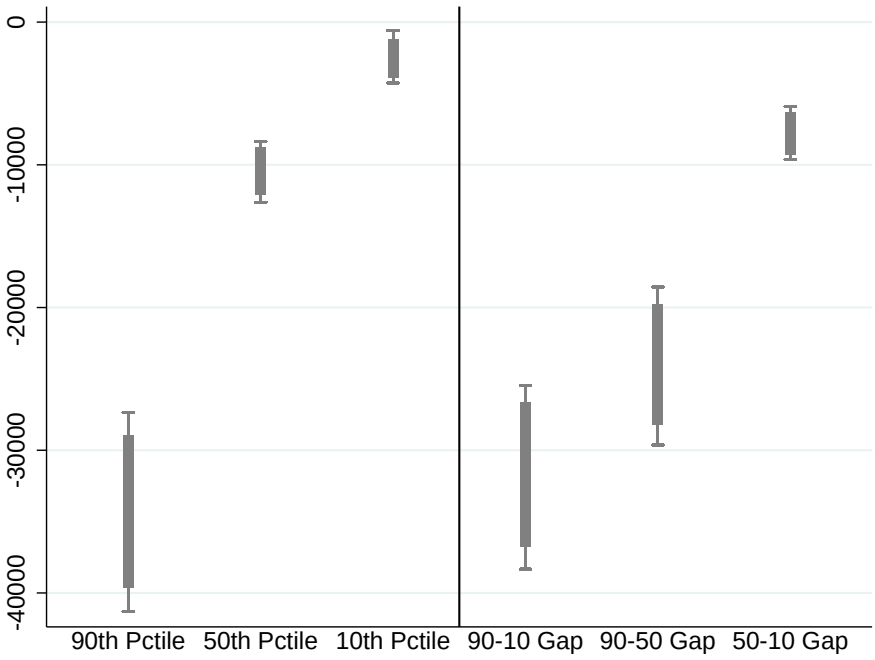
Panel B: V-A per NOK and Number of Domestic Workers



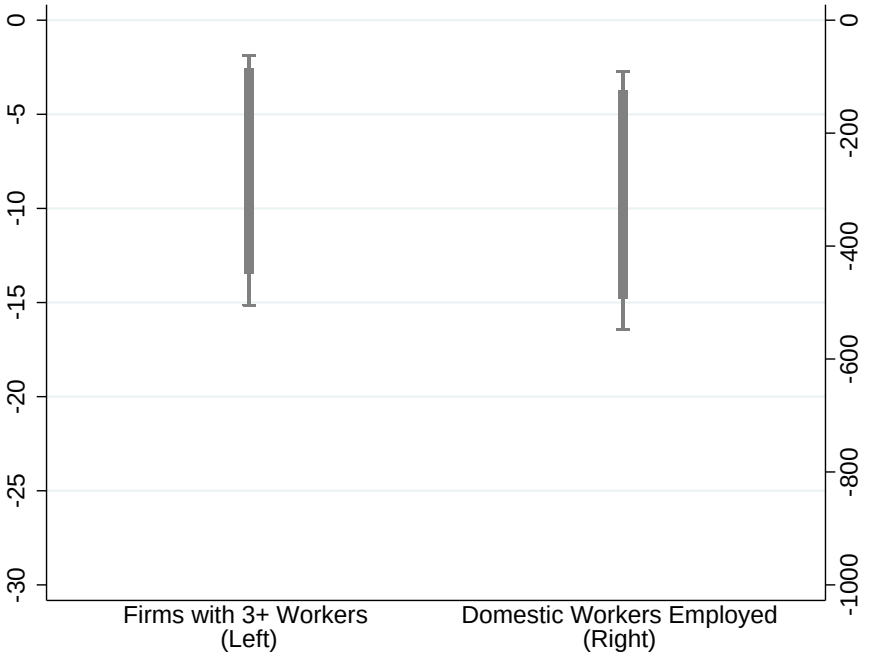
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Thick lines represent the 10th and 90th percentiles of the distribution of coefficients. Caps represent the 5th and 95th percentiles of the distribution of coefficients.

Figure A12: Norway Municipalities: Random Control Permutations

Panel A: Municipality Earnings Distributions



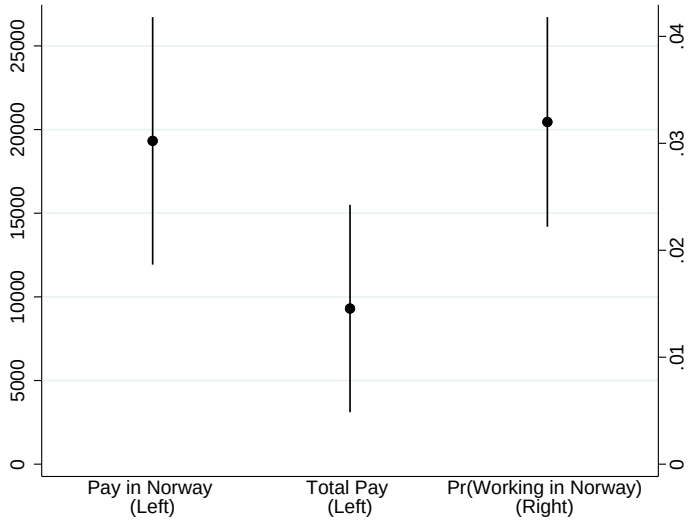
Panel B: Firms and Workers



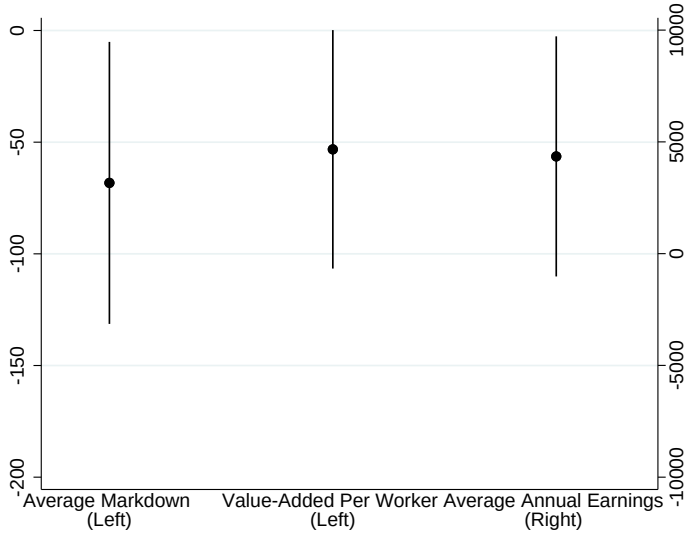
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Thick lines represent the 10th and 90th percentiles of the distribution of coefficients. Caps represent the 5th and 95th percentiles of the distribution of coefficients.

Figure A13: Sweden: All Municipalities as Controls, Excluding Major Metros

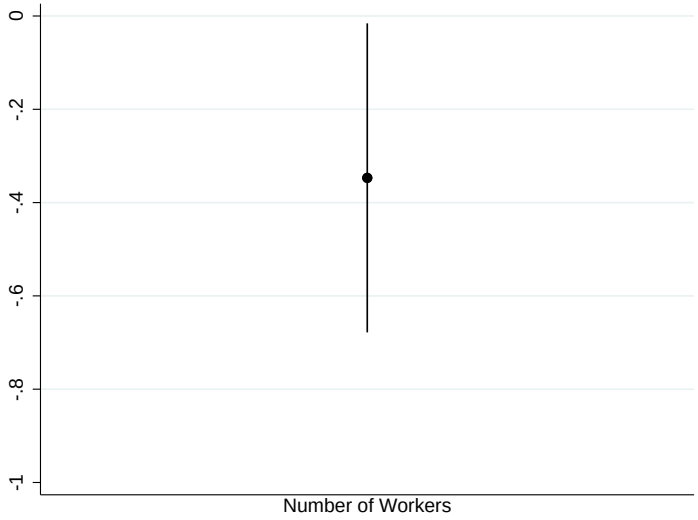
Panel A: Individuals



Panel B: Firms - Value Added and Markdowns



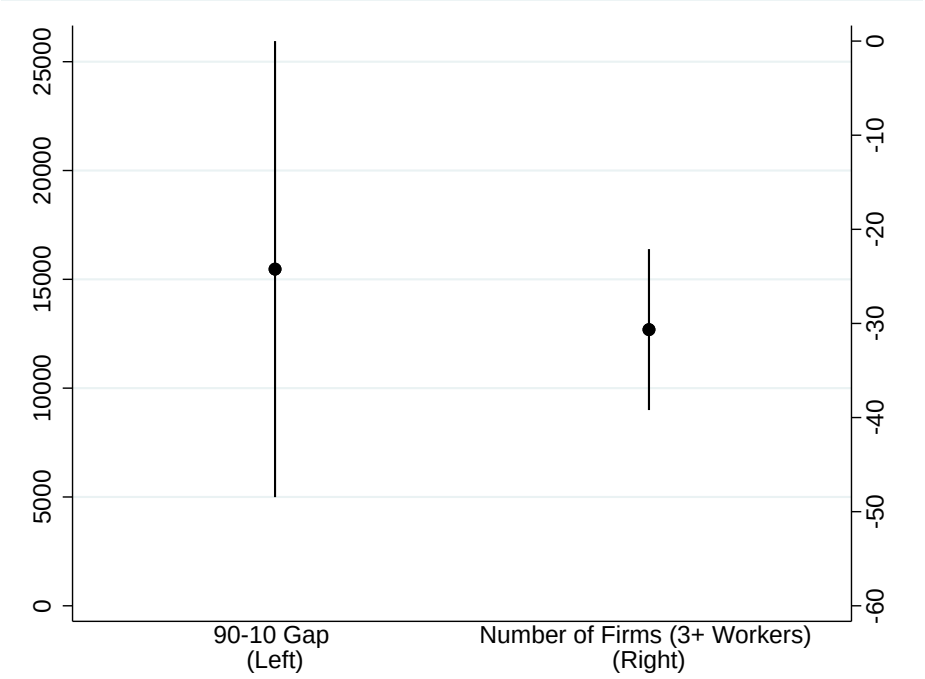
Panel C: Firms - Number of Workers



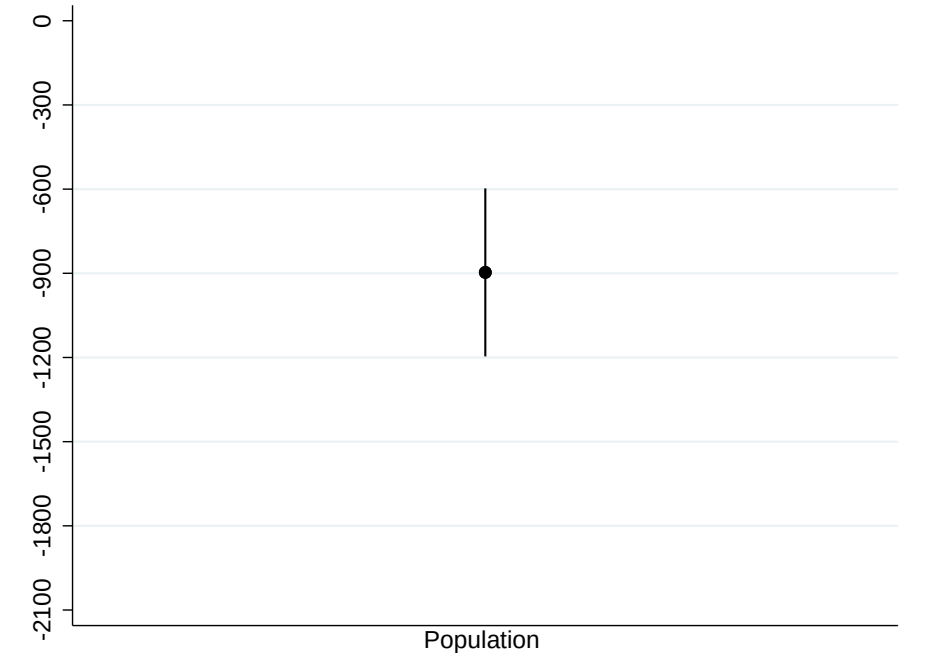
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Excluded municipalities are Stockholm, Gothenberg, and Malmö.

Figure A14: Sweden Municipalities: All Municipalities as Controls, Excluding Major Metros

Panel A: 90-10 Gap and Number of Firms



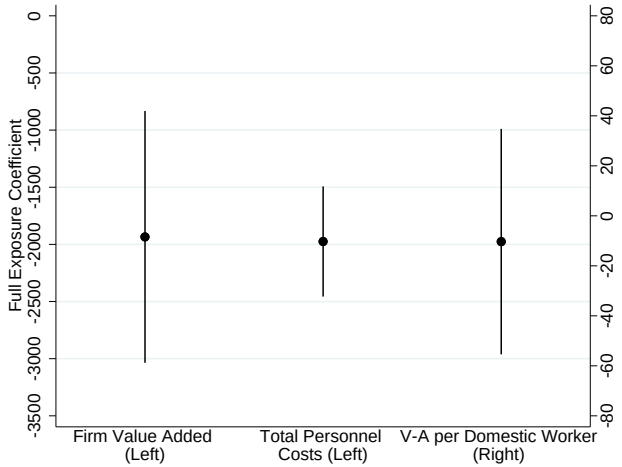
Panel B: Population



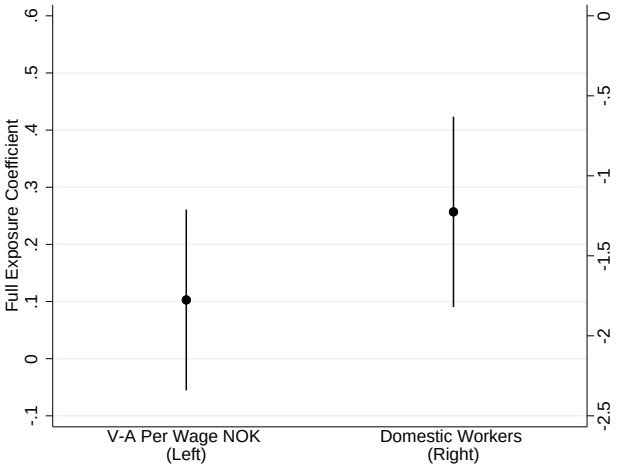
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2. Excluded municipalities are Stockholm, Gothenberg, and Malmö.

Figure A15: Norway Firms - All Municipalities as Controls
Excluding Oslo, Bergen, and Trondheim

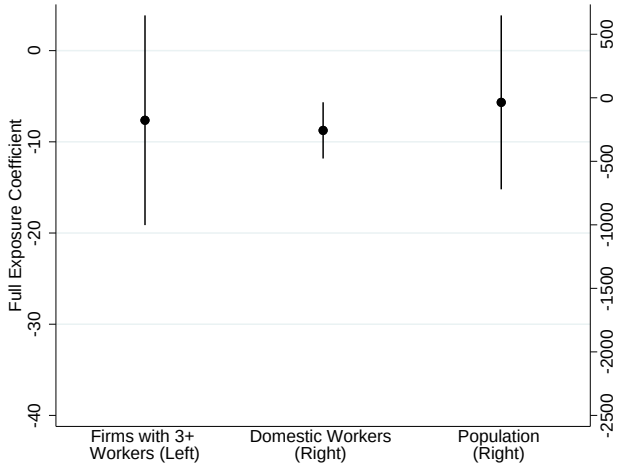
Panel A: Value Added and Personnel Costs (1,000s), V-A/Worker



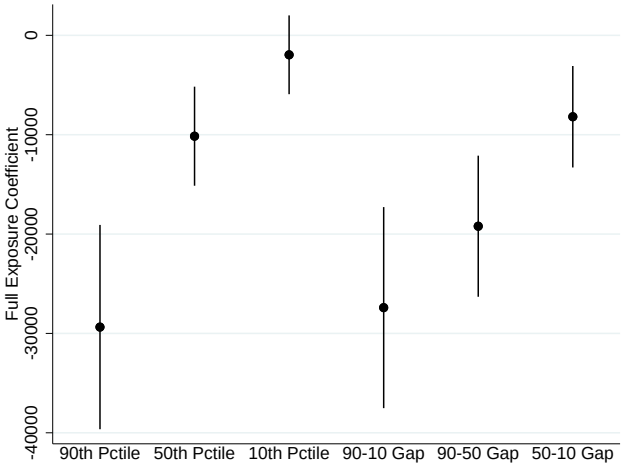
Panel B: V-A per NOK and Number of Domestic Workers



Panel C: Firms, Domestic Workers, Population



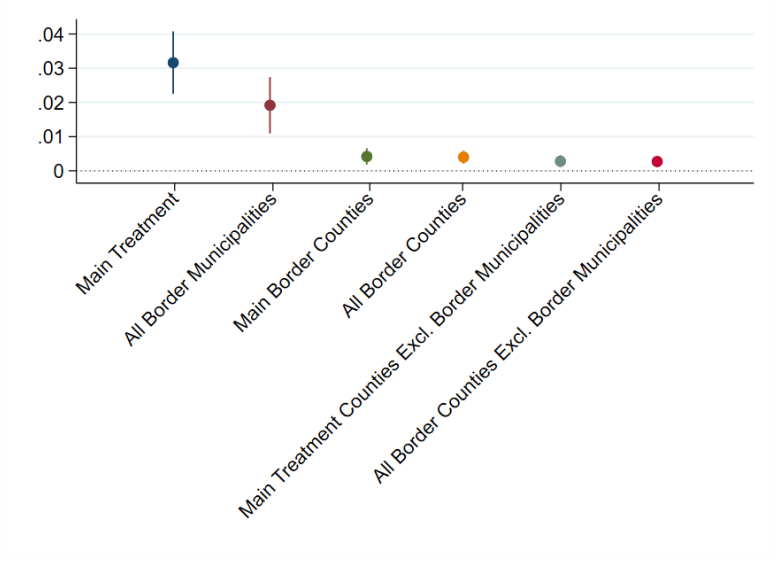
Panel D: Earnings Distributions



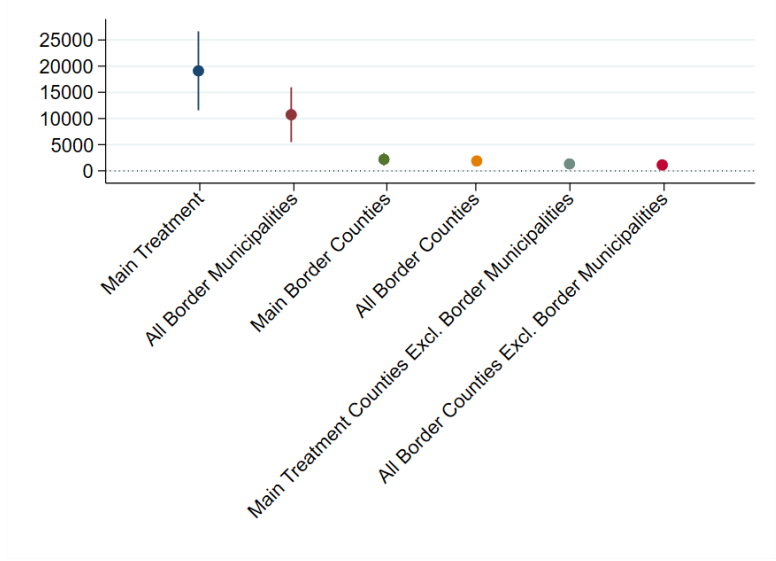
Source: Authors' calculations of Norwegian register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.

Figure A16: Alternative Treatments - Sweden, Individual Outcomes

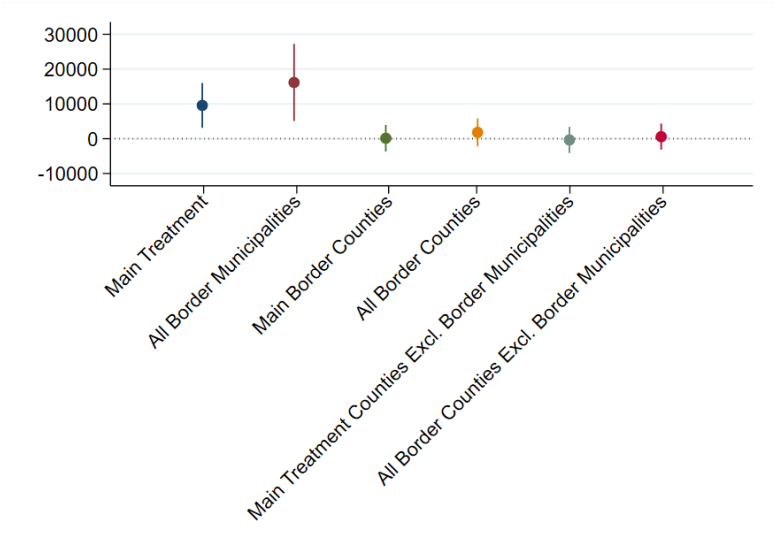
Panel A: Pr(Work in Norway)



Panel B: Earnings in Norway



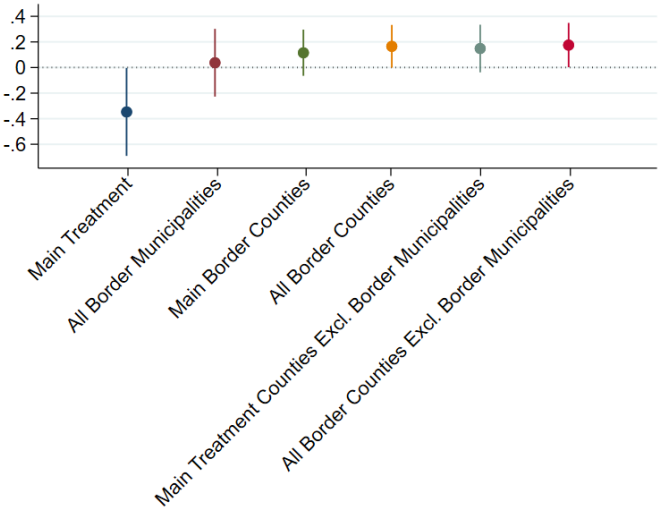
Panel C: Total Earnings



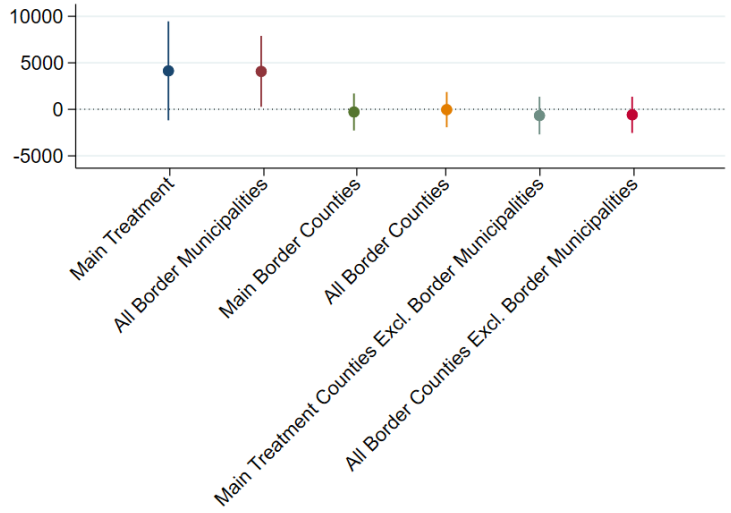
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.

Figure A17: Alternative Treatments - Sweden, Firm Outcomes

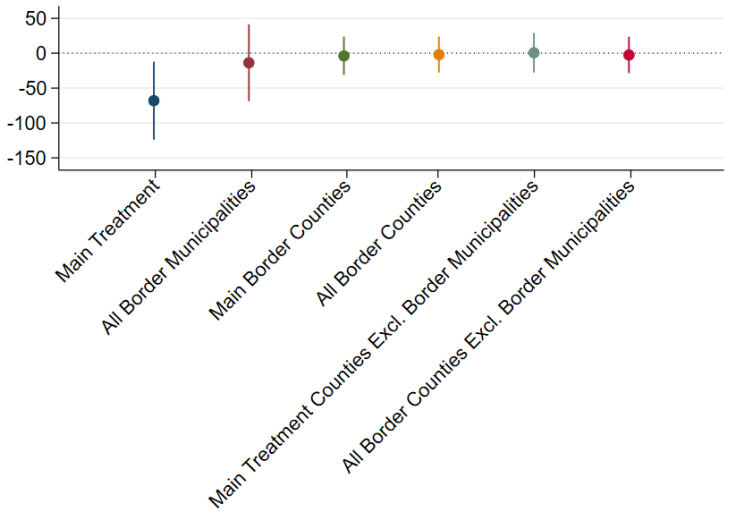
Panel A: Number of Workers



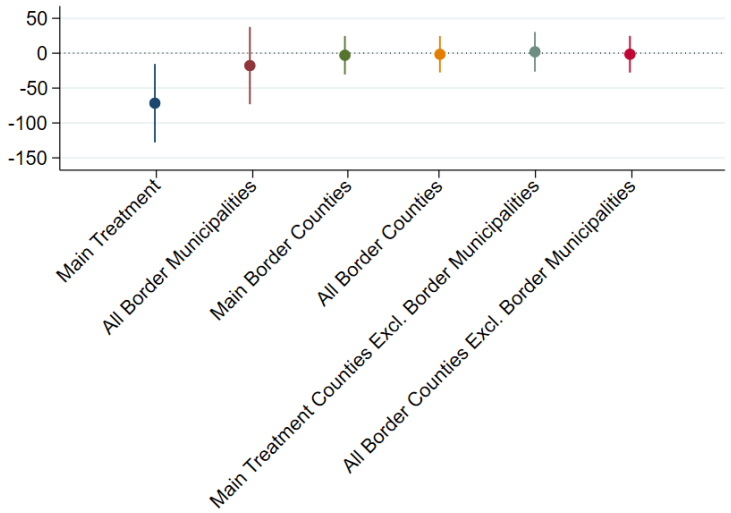
Panel B: Mean Annual Earnings



Panel C: Value Added Per Worker (1000s SEK)



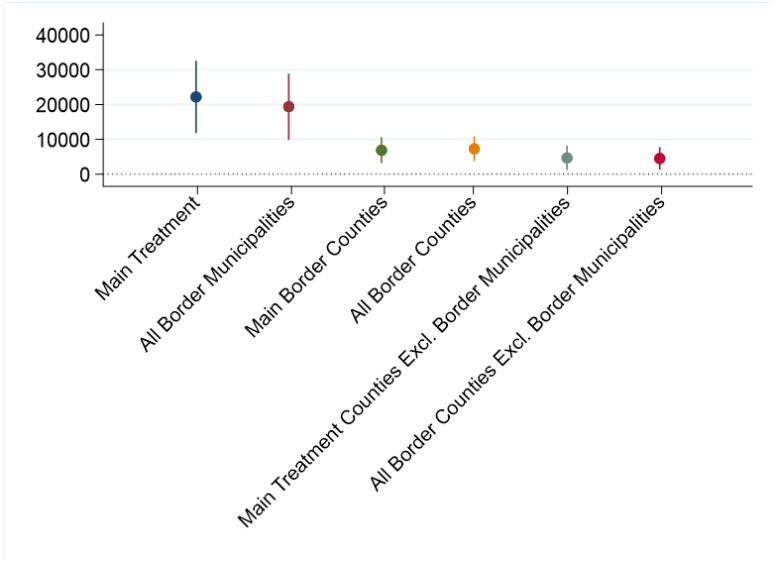
Panel D: Average Markdown (1000s SEK)



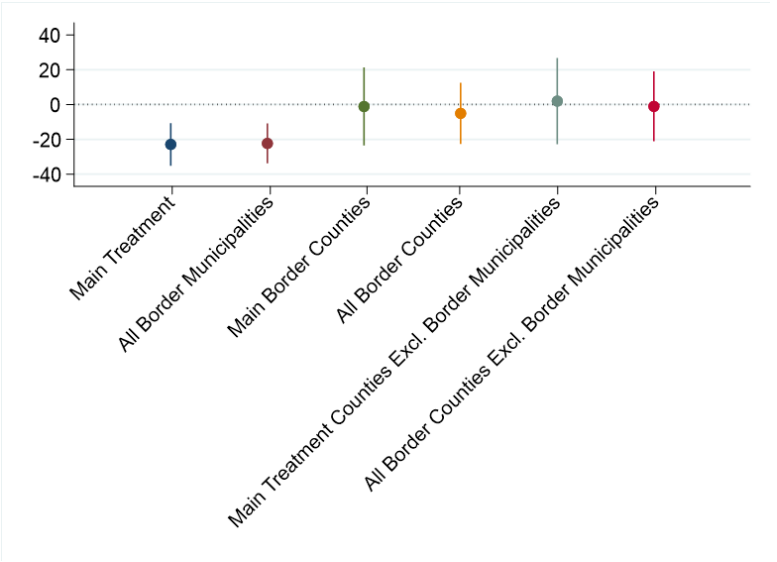
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.

Figure A18: Alternative Treatments - Sweden, Municipality Outcomes

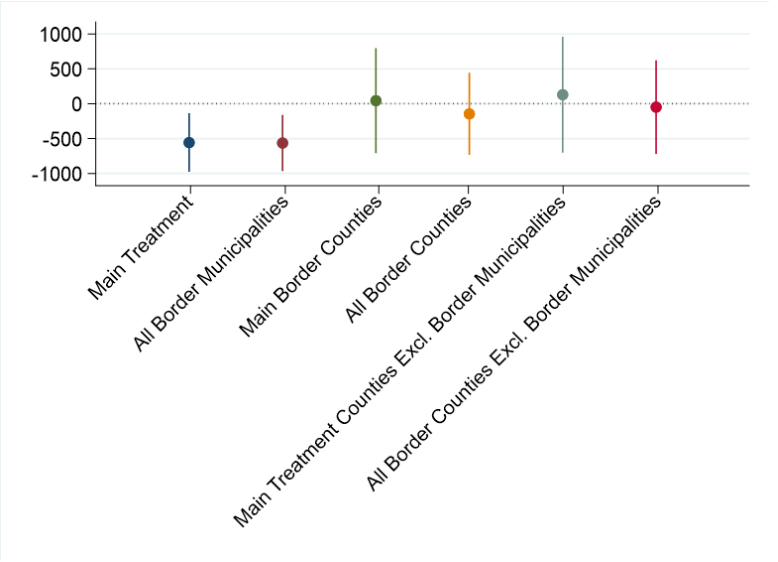
Panel A: 90-10 Percentile Gap



Panel B: Number of Firms (3+ workers)



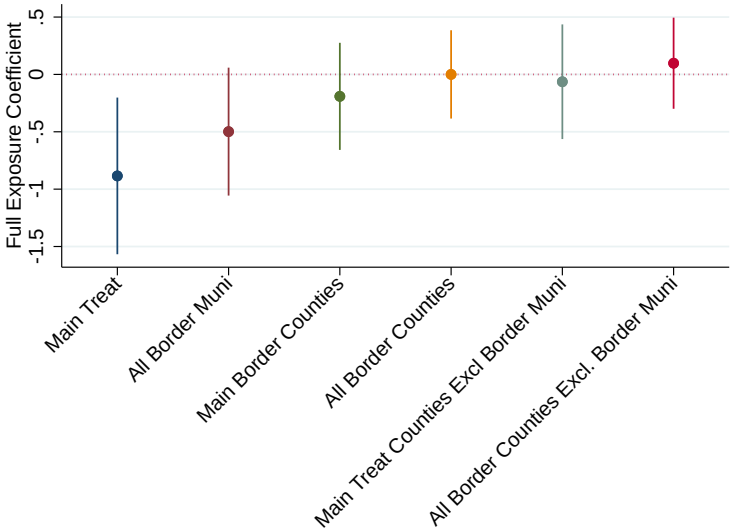
Panel C: Population



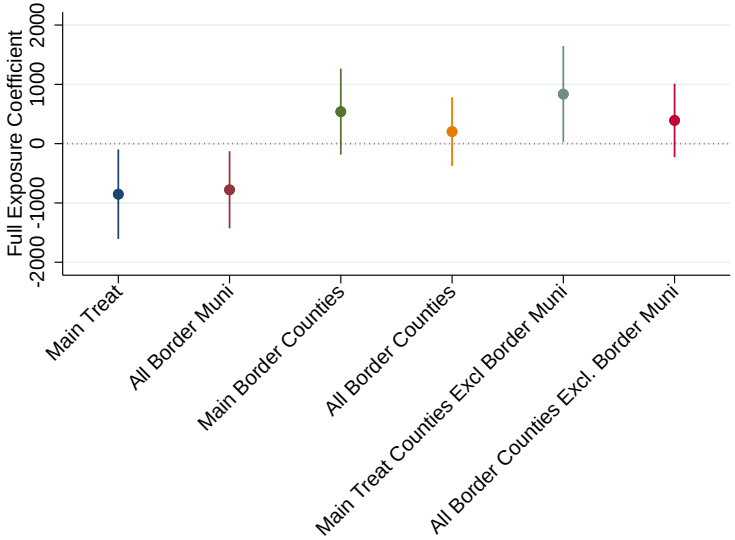
Source: Authors' calculations of Swedish register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.

Figure A19: Alternative Treatments - Norway, Firm Outcomes

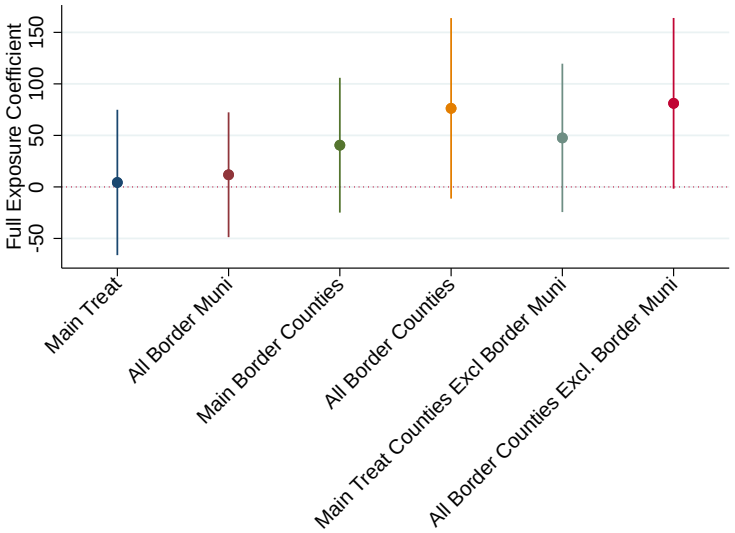
Panel A: Number of Domestic Workers



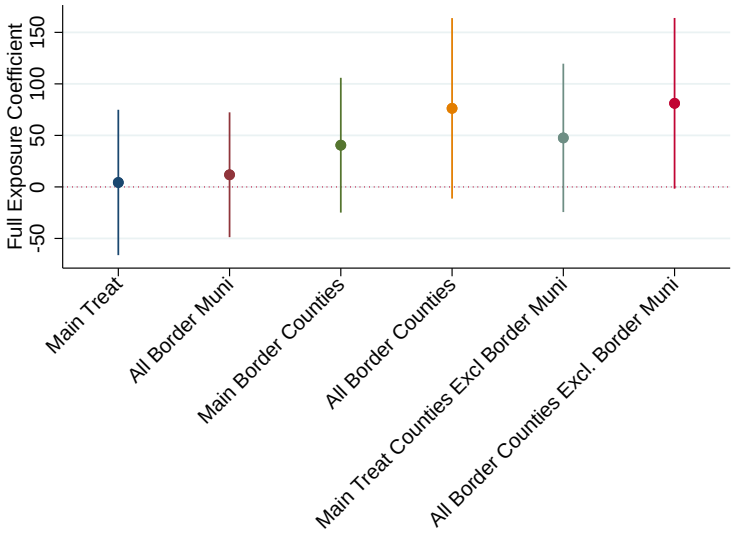
Panel B: Total Personnel Costs (1000s NOK)



Panel C: Value Added Per Domestic Worker (1000s NOK)

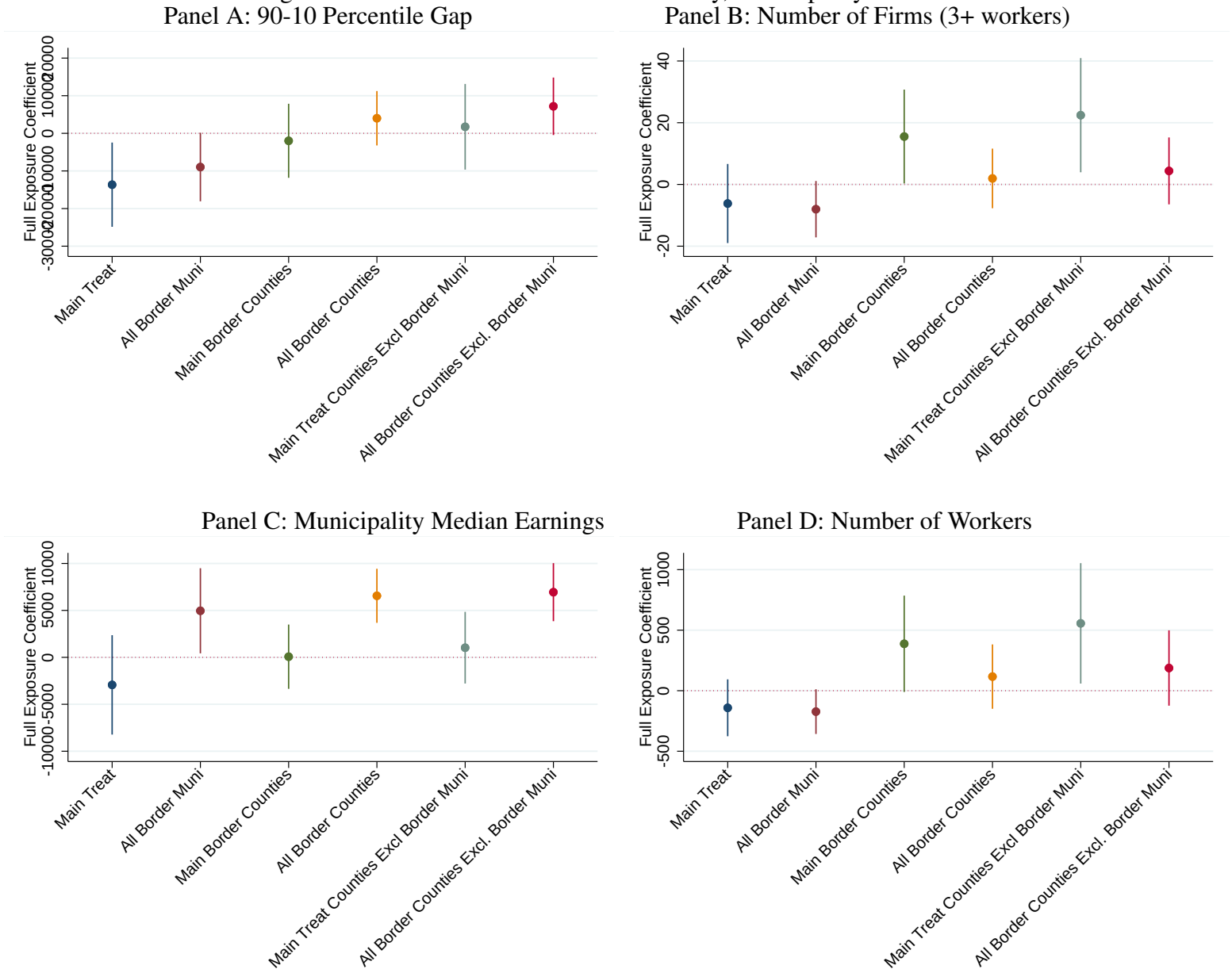


Panel D: Value Added per Wage NOK



Source: Authors' calculations of Norwegian register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.

Figure A20: Alternative Treatments - Norway, Municipality Outcomes



Source: Authors' calculations of Norwegian register data.
Notes: Coefficients refer to the full exposure coefficient from Equation 2.