Special Economic Zones and Firm Performance: Evidence from Vietnamese Firms

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Preliminary results - Please do not circulate!

Abstract

This paper seeks to answer whether SEZs help to promote spillovers from multinational firms to firms by increasing firms performance. We focus on the role of SEZs in creating spillovers to firms in the host country. We focus on firms operating in Vietnam from 2007-2019, and the information on SEZs of Vietnam. Our dataset allows us to track different dimensions to check for heterogeneity, including types of SEZs, firm sizes, industries, and especially firm types: whether they are foreign, private domestic or domestic state. We also establish a unique linkage between many multinational firms and their subsidiaries in Vietnam, and then with domestic firms inside and outside special economic zones. The dataset allows us to track tax identification numbers of the firms, and to check their names to match them with international datasets, like Orbis and ASEAN WIPO to observe additional details on their innovation efforts (like patents) or other investment/ financial information [1]. We use four measures to measure firm performance. To measure firm size, we use log number of employees, and log total sales. To measure productivity, we use labour productivity and TFP. Prior to SEZ

[1]The results for this will be updated in a future version of this paper

establishment, we find no difference between SEZ firms and non-SEZ firms conditional on 2-digit sector and province, and using sample of firms from 2007-2019, and removing firms treated in the first year of the sample (2007). After entering into SEZs, direct effects are observed - firms in SEZs show an increase in their sales and labor productivity. We then check for spillover effects for firms located in communes with SEZs (not accounting for firms in SEZ areas), and heterogenous effects by types of SEZs, types of firms, firm size, and industries. For spillover effects, we see a positive effect 1 year after SEZ establishment for firms located in the same commune with SEZs (increase by 11%). We do not see any effects for number of employees, labour productivity and TFP after SEZ establishment. For heterogeneous effects, we see an increase in productivity for firms located in industrial parks as well as large firms. Foreign-owned firms show an increase in sales, and manufacturing firms show an increase in both sales and labor productivity.

Keywords: innovation, technology, multinational, firms, place-based policies, SEZ, technology transfer, spillovers

JEL Codes: L11, L22, L25

1 Introduction

Increasing firms' performance through a higher level of productivity (output per worker), or an increase in output, or an increase in sales (revenue) is one of the main goal for developing countries to improve its standard of living over time, and moving from lower level of income to a higher level of income as comparable to other developed countries. A way for developing countries to close the gap is to learn from foreign firms to increase domestic firms' knowledge capabilities, investment and R&D. To achieve this, these countries can learn from foreign firms, thereby augmenting the knowledge, investment, and research and development capabilities of their domestic firms. This learning can occur through various channels, such as gaining insights from exporting practices (Loecker, 2013), engaging in global value chains (Taglioni and Winkler, 2016), or benefiting from knowledge transfer via labor mobility (Balsvik, 2011; Stoyanov and Zubanov, 2012).

One policy that could play an important role in closing the gap for developing countries is to set up special economic zones. These zones aim to attract foreign firms (usually multinational firms) to set up their operation in developing countries, and then in hope to create spillover effects to domestic firms. Special Economic Zones use fiscal localized incentives to attract FDI and transfer skills and technology from foreign/ multinational firms to domestic/local firms in developing and emerging economies. Creating SEZs is a popular policy, especially for developing countries, to attract FDI. The number of economies with SEZs increased from 29 economies with 79 SEZs in 1975 to 147 economies with around 5400 SEZs in 2018 (UNCTAD, 2018). However, their benefits are still in question. Although SEZs in China show a success in attracting FDI and foster local economic activity (Wang, 2013; Lu et al., 2019, 2023), failures are seen for SEZs in India (Alkon, 2018; Görg and Mulyukova, 2022) and Indonesia (Rothenberg et al., 2017). Therefore, spillover effects may not be expected.

Previous studies mostly focus on effects at aggregated level. For example, Alkon (2018); Nguyen and Tien (2021); Brussevich (2024) use analysis at district/ state level to identify several effects of SEZs. At granular scale, Gallé et al. (2023) measure the effects of SEZs at municipality level or at village level by Lu et al. (2019). Although in their studies, they sometimes mention the effects of SEZs on firms, their main research questions lie on the aggregated effects at village/ municipality/ state/ /district level. Only a few research focus directly on the effects on firms. A recent study is from Görg and Mulyukova (2022) on Indian firms which focus on productivity growth and find that SEZs do hot increase productivity growth for Indian firms. They explain the reasons might lie on the fact SEZs in India can

be only a single-firm located and there is a possiblity of rent-seeking in the area. However, India case might not be representative for other developing countries due to their size and population compared to the rest of the developing world. Research in this area is still need to be done to evaluate the effects of SEZs on firms' performance through improving technological and innovative capabilities.

Vietnam is another case study for Special Economic Zones. Over the past three decades, Vietnam has made significant efforts to attract foreign direct investment (FDI) by creating 18 coastal economic zones and a comprehensive network of 433 state-endorsed special economic zones across the country [2]. The Vietnamese government offers various incentives to firms and employees operating within SEZs, including tax breaks, complete tariff exemptions on certain goods, reduced corporate income tax rates, lowered rents and fees, and employee benefits, such as a 50% tax reduction for SEZ employees. Between 1991 and 2022, Vietnam has established SEZs in 61/63 provinces [3]. The policy aim for SEZs in Vietnam is to attract FDI and support economic growth from technology transfer. By establishing SEZs in almost all provinces in Vietnam, the government aims for regional development within Vietnam. Integration in regional supply chain with FDI mmainly from South Korea, Japan, Singapore is another goal of SEZs established by the Vietnamese government [4]. However, the extent of spillover effects on domestic firms does not seem to meet initial expectations. Multinational firms within SEZs continue to face challenges in finding suitable local suppliers for their operations, which contradicts the intended purpose of fostering technological advancements. Technology adoption remains low in Vietnam (Cirera et al., 2021). Particularly, manufacturing industry shows lower technology adoption compared to services (Cirera et al., 2021) which contradicts with the development of SEZs where they mostly attract firms in manufacturing industries and aim to create knowledge spillovers to domestic firms, especially firms in manufacturing.

This paper seeks to answer **whether SEZs help to improve firms' performance**. In the scope of this study, we focus on the role of SEZs in creating spillovers effects from multinational firms to domestic firms in the host country (including firms that have affiliates with the multinational firms located in the SEZs, domestic firms within SEZs, and domestic firms located outside SEZs). We focus on firms operating in Vietnam from 2007-2019, and the information on SEZs of Vietnam. We could also establish a unique linkage between

[2]Data is from the report by Ministry of Investment and Planning. Report can be accessed through this link: https://datafiles.chinhphu.vn/cpp/files/duthaovbpl/hosodenghixaydungluat.pdf. 433 includes national industrial parks (state-endorsed), export processing zones, high-tech zones and border zones.

[3]See figure 1 for the development of number of SEZs over time from 1991 - 2022

[4]Data from the report of Ministry of Investment and Planning

many multinational firms and their subsidiaries in Vietnam, and then with domestic firms inside and outside special economic zones. The dataset allows us to track tax identification numbers of the firms, and to check their names to match them with international datasets, like Orbis, PATSTAT and ASEAN patent dataset, to observe additional details on their innovation efforts (like patents) or other investment/ financial information.

Prior to SEZ expansion, treated firms and never treated firms show similar trend after conditioning on 2-digit industry and province with a balanced sample and remove firms treated in the first period (2007). At the time of SEZ expansion, the trajectories of these two groups do not differ in terms of number of employees, revenue, labour productivity and TFP. Our main empirical strategy using staggered treatment timing by (Callaway and Sant'Anna, 2021). We also address the points of selection bias for firms entering into SEZs and how and where SEZs were built. Therefore, we use propensity score matching to match each SEZ firms with 3 nearest non-SEZ firms based on 2-digit industries codes, province, 1-year, 2-year and 3-year outcomes (employment, sales, and assets) before the event to ensure that firms in our sample residing in SEZ and non-SEZ areas had very similar trends. The matching and event study analysis show similar results to our baseline results. We also conduct different heterogeneity tests for different types of SEZs, types of firms, sizes of firms and industries. Prior to SEZ establishment, we find no difference between SEZ firms and non-SEZ firms conditional on 2-digit sector and province, and use sample of firms from 2007-2019, and remove firms treated in the first year of the sample (2007). After entering into SEZs, direct effects are observed - firms in SEZs show an increase in their sales and labor productivity. We then check for spillover effects for firms located in communes with SEZs (not accounting for firms in SEZ areas), and heterogenous effects by types of SEZs, types of firms, firm size, and industries. For spillover effects, we see a positive effect 1 year after SEZ establishment for firms located in the same commune with SEZs (increase by 11%). We do not see any effects for number of employees, labour productivity and TFP after SEZ establishment. For heterogeneous effects, we see an increase in productivity for firms located in industrial parks as well as large firms. Foreign-owned firms show an increase in sales, and manufacturing firms show an increase in both sales and labor productivity.

Most papers on the impacts of FDI focus on spillover effects to domestic firms through vertical or horizontal linkages (Keller, 2021; Lu et al., 2017). Our paper, however, focuses first on the impacts of FDI through linkages between multinational firms and their affiliates, and then from affiliates to other domestic firms, located inside or outside of SEZs. Doing so, our paper will try to link the multinational firm operation in Vietnam with their headquarters/ the multinational firms in their home country. Our approach is related to Görg and Mulyukova

(2022) in terms of setting this linkage, who, however, matched their data in an opposite direction. That is, they have a list of US multinational firms, and then try to find the subsidiaries of these firms in China. Our methodology will be the opposite way – from tax information, to track the names of the multinational firms, and match with international dataset, like Orbis, PATSTAT and ASEAN patent dataset [5].

Second, the literature on the impacts of SEZs can only proxy for the impacts of SEZs mostly at district levels (Wang, 2013) or at village levels (Lu et al., 2019). The reason is there is no data available to track the exact locations of the enterprises. However, this type of proxy can overestimate the levels of impacts of SEZs since most SEZs only has a piece of land in a village (district) or spreads out through many villages (districts). Our paper can exactly determine whether a firm is located inside or outside and SEZs, based on their exact address. The Vietnamese data allows us to track the exact location (whether they belong to the SEZs or not), instead of proxying their location at the village or district level. We can thereby estimate more precisely the spillover effects from affiliates to domestic firms located within SEZs, and located outside SEZs (even could estimate the level of distance for spillover effects). In addition, we also manually collect not only data on national SEZ, but also on provincial SEZs. As far as we know, this also an additional feature compared to previous studies where they mostly focus on state-endorsed or national SEZs [6].

Third, the literature on industrial upgrading mostly focuses on labour productivity to proxy for upgrading. we argue that labour productivity is an important measure, however, it is not enough to measure the levels of upgrading. Keun Lee (2024, forthcoming.) argue that the domestic capability is one of the most important measures for a country to escape from middle-income traps. Our paper's data allows us to have different proxy for upgrading, not only on labour productivity, but also on technology adoption and investment in machines, investment in R&D, and domestic innovative capability.

While our study focuses on the case of Vietnam, findings will be of broader interest for policy discussions in low- and middle-income countries, given: the persistent popularity of SEZs as an FDI-attraction tool; middle-income traps amid increasing levels of FDI but without increasing capabilities among domestic firms in technology and R&D investment. To be specific, our study helps to improve our understanding spillover effects of SEZs, helping governments to decide on how to support domestic firms and at the same time, promote attracting FDI. This study will be particularly important for countries that are similar to

[5]This analysis will be done in future steps when we testing mechanisms explainning innovative capabilities of domestic firms

[6]See Table for a descriptive analysis of national and provincial SEZs in Vietnam

Vietnam – a small emerging economy that relies on FDI to promote development. We believe that our project can expand the academic frontier and provide a practical policy guide for developing countries.

2 Literature Review

For literature in technology transfer, paper by Ning et al. (2023) explores a channel of knowledge transfer through MNCs to local firms which is the local clustering of returnees (skilled returned migrants) interacting with the underlying technological characteristic to create different interactive environments for incorporating foreign knowledge. They use a sample of 35,376 firms over an 11-year period in a China's region equivalent of Chinese Silicon Valley. Bai et al. (2020), on the other hand, also focus on Chinese firms but find that affiliated domestic automakers tend to adopt the quality strengths of their joint venture partners, consistent with learning and knowledge spillovers. They find that worker flowers and supplier networks mediate knowledge spillovers. Similarly, Bajgar and Javorcik (2020) look at Romania firms and find a positive relationship between the quality of products exported by local firms and the presence of multinational enterprises (MNEs) in the upstream (input-supplying) industries. They find a similar, though less robust, relationship is found for FDI in downstream (input-sourcing) industries and the same industry. Alfaro-Urena et al. (2022) also look at the impacts of multinational firms but using firm-to-firm linkage and find that four years after, domestic firms employ 26% more workers and have a 4% to 9% higher total factor productivity (TFP). These effects are unlikely to be explained by demand effects or changes in tax compliance. Suppliers experience a large drop in their sales to all other buyers except the first MNC buyer in the year of the event, followed by a gradual recovery.

For literature in FDI spillover, Harrison and Rodríguez-Clare (2010) has a review on industrial policy in developing countries and find that there is no support for "hard" interventions that distort prices to deal with Marshallian externalities, learning by exporting, and knowledge spillovers from FDI.

For literature in special economic zones, Seiler et al. (2023) investigate the impact of special economic zones (SEZs) on economic growth. This policy tool to have added up to CNY 7,166 to GDP per capita compared to a synthetic counterfactual without such a policy. Lu et al.

(2019) find that establishing zones is found to have had a positive effect on capital investment, employment, output, productivity, and wages, and to have increased the number of firms in the designated areas. Net entry plays a larger role in generating those effects than incumbents. The special zone program's net benefits over three years are estimated to amount to about US$15.62 billion. And capital-intensive industries benefit more than labor-intensive ones from the zone programs. Chen et al. (2019), on the other hand, find that on average, loss of development zone policies results in 6.5% loss of firms' TFP. Within 500 kilometers from the three major seaports in China, closure of zones reduced firm-level TFP by 9.62%, whereas closure of zones farther away did not show significant effects. Market potential and local within-industry spillover effects can explain much of this locational heterogeneity. They concluded that China's strategy of using development zones as a place-based policy to encourage inland development may have led to spatial misallocation. Neumark and Simpson (2015) provide an excellent review about place-based policy and find that Hasan et al. (2021) look at Indian place-based policy and find that - the program led to remarkable growth in the manufacturing sector in the better-off backward districts, which account for about one third of all backward districts with gradation scores nearest to the cutoff, over four years after the policy was introduced. The effects largely accrued to light manufacturing industries (with about a 60% increase in both number of firms and employment), while some results suggest a modest increase (about 20%) in heavy manufacturing industries. They investigate the effects of the program on firm formalization and spatial spillovers generated by the program. In 2005, six years after the program cut its tax benefits by three fourths and one year after the program ended, the estimated effects for manufacturing industries diminish and lose statistical significance. This indicates that the program failed to generate self-sustained agglomeration economies in the treated areas. Thus, the economic returns to the program seem to be rather limited. LaPoint and Sakabe (2021), on the other hand, look at corporate investment from place-based policies and find that they rule out "toe dipping," or firms making small reversible investments to capture tax benefits and then exiting shortly thereafter. For listed firms, capital shares within a firm's internal network are stable three decades after the bonus depreciation incentives expired. Corporate investment was concentrated in construction projects on existing production sites. They find granting firms Technopolis eligibility generated a 0.29 standard deviation increase in construction spending, and a 0.40 standard deviation increase in non-real estate (i.e. machine) purchases. They could differentiate between long-lived capital (buildings and machines) vs. short-lived capital (tools and vehicles). Long-lived capital firms gain more in an immediate cash flow sense from becoming eligible to claim spatial bonus depreciation, since normally the tax code would require them to amortize costs over a much longer period. Lerche (2022) estimates the direct effects

of investment tax credits on firms' production behavior and the additional indirect effects arising from agglomeration economies. They exploit a change in tax credit rates by firm size in Germany, I find that manufacturing firms increase capital and employment, with labor demand in information and communication technology intensive industries shifting towards college-educated workers. Using geolocation data, they show that agglomeration benefits lead to a sizable further firm production expansion with these benefits materializing within distances of 5 kilometers. Worker flows from the service sector and from non-employment, rather than between manufacturing firms, explain the employment effects. Atalay et al. (2023) investigate the impact of a set of place-based subsidies introduced in Turkey in 2012. They find an increase in economic activity in industry-province pairs that were the focus of the subsidy program, and positive spillovers to the suppliers and customers of subsidized firms. In the long run, the subsidy program is modestly successful in reducing inequality between the relatively under-developed and more prosperous portions of the country. These modest longer-term effects are due to the ability of households to migrate in response to the subsidy program and to input-output linkages that traverse subsidy regions within Turkey.

For literature in innovation of multinational firms, Bilir and Morales (2020) have an insight that location-specific policies encouraging innovation create within-firm gains that are realized abroad since innovation within these firms is spatially concentrated by comparison, with a large share of firms pursuing innovation investment in only one (headquarters) country, and then shared with foreign sites for efficiency gain. They find that affiliate performance process may respond to R&D investments of the affiliate itself, its US headquarters (parent), or other affiliates within the same firm. They also find that parent and affiliate R&D are complementary.

3 Background on Vietnam SEZs

3.1 Brief History

Vietnam has started implementing special economic zones since 1993. The main motivation behind establishing SEZs is to have a specific areas as a piloting reforms of the economy to attract foreign and domestic investment, promote international trade, increase employment, and stimulate technology transfer. The 7th Congress's Political Report in 1991 outlined a five-year plan (1991-1995) focusing on economic stability and growth, emphasizing policies to attract foreign investment, particularly in manufacturing. This pivotal strategy laid the

groundwork for the development of Export Processing Zones (EPZs) and Special Economic Zones (or Industrial Parks) (SEZs) in Vietnam. Following this, critical legal frameworks were established, including the 1994 Law on Domestic Investment Promotion and the Foreign Investment Law of 1987 (amended in 1990, 1992, 1996), along with specific decrees on EPZs and SEZs (1994, amended in 1997, 2008, 2015, 2018, 2022). The first Tan Thuan EPZ in Ho Chi Minh City was created in 1991, leading to the establishment of 12 EPZs and SEZs by 1995, primarily in Ho Chi Minh City and Hanoi. SEZ specified in the decree 1994 are concentrated industrial zones established by decision of the Government, with defined geographical boundaries, specializing in industrial production and providing industrial production support services, not populated (Government Degree, 1994). Vietnam then established its first Open Economic Zones called Chu Lai in Quang Nam Province (Decision No. 108/2003/QD-TTg). The Vietnamese SEZ program is similar to the SEZ program in China which is described by the World Bank as a unique zone-within-zone case because large opened economic zones (the whole municipality) hosted smaller zones (state-level and province-level economic zones) within their territory.

Firms in SEZs have important preferential policies include:

Tax Deductions and Customs Duty Exemptions. - Corporate income tax rates ranging from 12 to 18 percent for manufacturing firms (exempt from income tax in two years since having profits) and 22 percent for service firms (exempt from income tax in one year after having profits) (Decree 192/CP, 1994) - applies to only foreign firms. For domestic firms, the tax rates are similar to other Vietnamese firms located outside SEZs. In 2002, there are some changes for tax deductions of foreign firms. High-tech manufacturing and service firms in high-tech zones pay 10% income tax, with an 8-year profit tax exemption from the first profitable year. For export processing firms, manufacturing firms pay 10% income tax, with a 4-year profit tax exemption. Service firms pay 15% income tax, with a 2-year profit tax exemption. For SEZs firms, those exporting less than 50% of products pay 15% income tax and get a 2-year profit tax exemption. For 50% to 80% export, there's an additional 50% profit tax reduction for the next 2 years; over 80% export, the rate is 10% with the same exemptions and reductions. Service firms pay 20% income tax, with a 1-year profit tax exemption. For 2008 regulation, new firms from investment projects are eligible for a corporate income tax rate of 20% for 10 years. They also receive a corporate income tax exemption for the first 4 years, followed by a 50% reduction in tax due for the next 9 years. SEZs benefit from incentives outlined for regions with challenging socio-economic conditions. Those SEZs established in locations with particularly difficult socio-economic conditions receive further advantages aligned with these specific areas. Economic zones are

entitled to the preferential policies that apply to regions facing particularly difficult socio-economic challenges. The standard tax rate is 25 percent in Vietnam.

Land Rent Exemption. - Firms can receive land rent exemption during the construction period and land rent exemption for 11 years from the date the project is completed and put into operation.

Preferential Policy in Securing Bank Loans. - Firms are permitted to access state investment credit, limited to a maximum of 70% of the total investment amount [7]

Reduced Tax for Employees in the Zones. - There are 50% income tax reduction for people whose income is subject to income tax, including Vietnamese and foreigners working in the zones.

As of December 2022, Vietnam has developed a widespread network of SEZs (industrial parks) and economic zones. This network includes: (i) Special Economic Zones (or also called Industrial Parks, from now on we refer this is SEZs): There are 403 SEZs and 4 export processing zones. These SEZs are established in 61 of the 63 provinces and cities, except Dien Bien and Lai Chau. Out of these, 292 SEZs are operational, the rest are still being developed. Vietnam also has Border Gate Economic Zones. There are 26 of these zones in 21 provinces and cities with land borders. In our analysis, we do not include this type of zone as SEZs as they serve different purposes. The Border Gate Economic Zones are mostly used for goods exchange and duty-free shopping rather than technology transfer. The last type is Coastal Economic Zones. There are 18 zones in 17 provinces and cities along the coast. These coastal zones have planned for various functional use, including non-tariff, industrial, commercial, tourism, and service sectors. Figure 1 shows the geographic distribution of the SEZs established in five waves: the 1991-1993 wave, the 1994-1996 wave, the 1997-2002 wave, the 2003-2008 wave, and the 2009-2019 wave.

Vietnam's SEZs differ from other place-based programs in developed countries context. First, their beginning goal is to attract foreign investment and have the areas as leading regions in the country to drive the country's economic growth as well as the regions' economic growth while for US or European's context, these place-based programs mainly to reduce inequality between regions. Therefore, in Vietnam's context, it can create unbalanced economic development between SEZs and non-SEZs regions Second, a as a developing country, Vietnam also faces with weak governance and limited funding. Before the introduction of SEZs,

[7] https://baochinhphu.vn/de-xuat-cac-chinh-sach-uu-dai-ho-tro-phat-trien-cum-cong-nghiep-102230117164131883.htm

Table 1: SEZ in Vietnam breakdown

	1991-1993	1994-1996	1997-2002	2003-2008	2009-present
Number of zones newly established	3	17	66	221	210
National-level SEZs	3	17	66	221	210
- Northern region	0	3	14	98	107
- Middle region	1	3	12	35	58
- Southern region	2	11	40	88	78

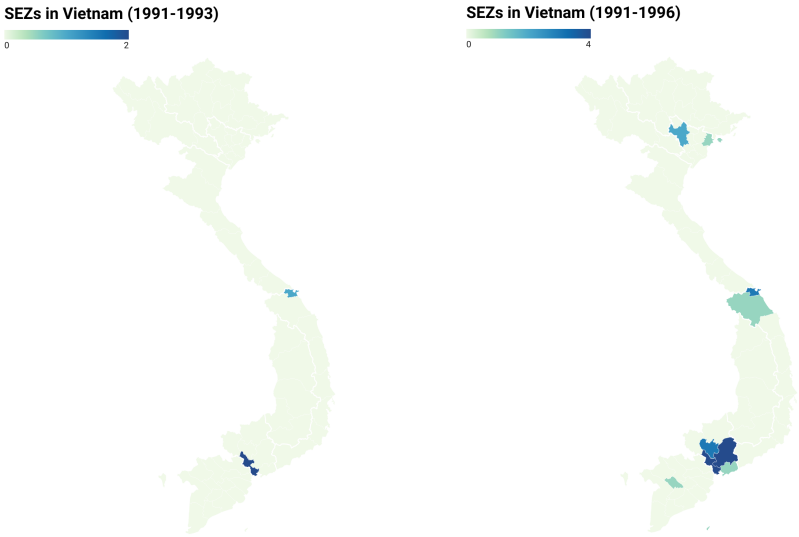
Vietnam's infrastructure such as utilities, telecommunications, transports, and other basic services are poor, therefore, the introduction of SEZs is also a commitment from the Government to improve the infrastructure in these specific areas while for other parts of Vietnam, the business environment has largely remained unchanged This also contrasted a difference between Vietnam and other developed countries where they invested in lagging regions but the other regions already have investment in infrastructure and good business environment. In a way, Vietnam's SEZs are also a mirror of Chinese's SEZs where they also have national and provincial SEZs, and the goal is also to attract foreign investment which favourable policies and investment in infrastructure in the SEZs. However, SEZs from Vietnam can give us another perspective where the policy is implemented in a small open economy which faces even harder competition with other big economies like China and India. The tax rate in Vietnam is 10% for firms in SEZs areas, while for China is 15 percent - 24 percent (Lu et al., 2019). Vietnam also faces with an even harder limited budget for infrastructure development in these areas compared to China

3.2 Selection into SEZs and Summary Statistics

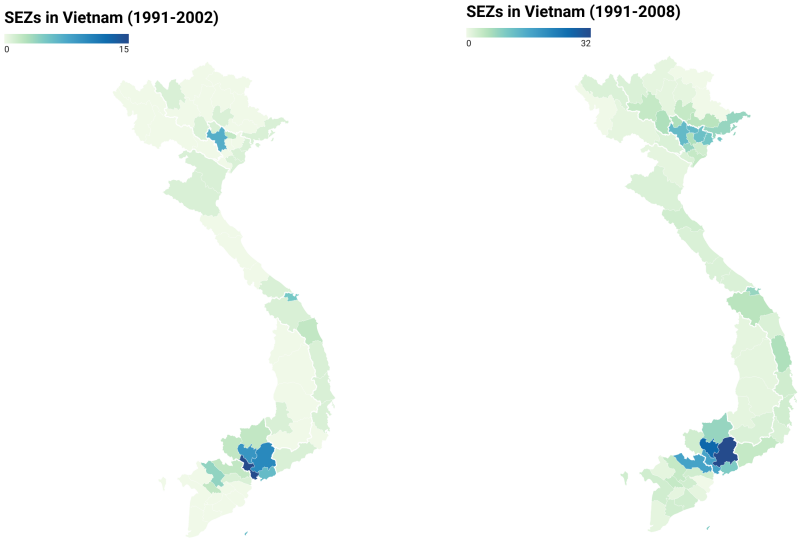
SEZs in Vietnam are not established randomly, but were decided based on their critical and favourable geographic location with good human capital, especially for the first SEZs - which only established in Hanoi and Ho Chi Minh City - which were the two largest cities in Vietnam at the time. This selection bias could overestimate our results in estimating the effects of SEZs on firms' performance and technology transfer as firms located in these areas could be already in a positive performance trends even without establishments of SEZs. Furthermore, Figure 1 illustrates that there is great heterogeneity with respect to the number of established zones across provinces, with some provinces having 38 zones (Dong Nai) compared to some provinces having only 1 or 0 zone (Dien Bien, Son La, etc - in the Northern part of Vietnam). However, as SEZs were later expanded to almost all of provinces

in Vietnam (see Figure 1), we will focus on the later years from 2011 - 2019 in the first set of exercise, then in the future, we could expand to the earlier years where we have complete data since year 2000 - we will explain more in the data and sample.

(A) Left: SEZs in Vietnam (1991-1993); Right: SEZs in Vietnam (1991-1996)



(B) Left: SEZs in Vietnam (1991-2002); Right: SEZs in Vietnam (1991-2008)



(C) SEZs in Vietnam (1991-2022)

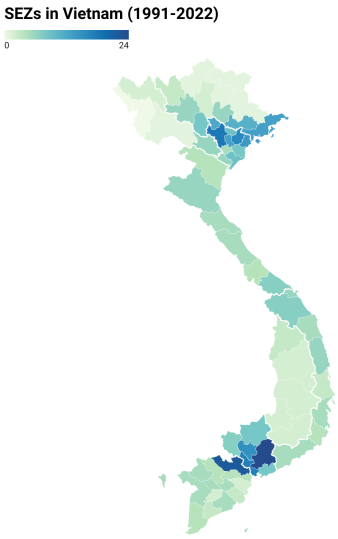


Figure 1: SEZs development in Vietnam from 1991-2022

The selection bias mentioned earlier comes from between province selection bias. However, even within a given a province, SEZs were not randomly located. For example, SEZs in a province will be chosen based on their central geographic located in the province. Therefore, we will have another site selection bias. The selection bias described above coming from SEZs selection bias. However, what we focus here is firms. But firms when choose their location were also considering where to locate their businesses. We have another selection bias coming from firms choosing their own location to set up business. Therefore, a critical question is how to choose a comparable control group? We will explain this in more details in section empirical strategy.

4 Data and Methodology

4.1 Sources

Firm Data.—The Enterprise Survey collects information from all firms operating in Vietnam on their identification, industry activities, labor, and firms' outcomes. The main information includes firm identification (name, address, activities, business type, and branches); labor and income (number of employees and their income, etc.); firms' results and costs (performance, expenses, investment, product output, energy use, etc.); and sometimes information about export and import activities of the firm.

The Survey is conducted by General Statistics Office of Vietnam, and is collected annually starting from 2000. We have available data from 2000 - 2019, however, as explained in the last section, SEZs in prior years suffer from bias in selection of SEZs geographically in the country. In the later years, SEZs expand to almost all provinces in Vietnam, we will focus on the later years to avoid selection bias. We use "ma_thue" variable (tax identification number - unique for each firm across years) to create a panel data from 2011-2019 [8]. The "ma_thue" variable is a 10-digit character to identify each firm and the tax office that they belong to. However, the data from 2000-2010 includes the "ma_thue" variable with only 9-digit character and not directly linking to the 10-digit character. Therefore, to match with this period, we need to use other matching strategies to match firms. Because of these

[8]McCaig et al. (2022) use "madn" to match between years. Indeed, this variable does not have many duplicates like "ma_thue", however, as we want to check firms' names and address later with the government website providing information related to tax id, firms' names, and address, we prefer to use "ma_thue" to match between years. In addition, for some years like 2000-2010 or year 2014 without "ma_thue" or 9-digit "ma_thue", we also use madn and other variables to identify firms

two reasons: selection bias and data limitations, our main and first exercise is to estimate the impact of SEZs on technology transfer of firms in the period 2011-2019. Appendix A3 describes our process of cleaning the dataset.

Firm SEZ Status.—The Survey includes information about the exact address of the firms (whether they are located in SEZs or not). We will use this information combined with manually collected data on SEZs information from Ministry of Planning and Investment and other private sources about SEZs to check if a firm is located in a SEZ or not.

SEZs information.—We manually collected data on SEZs information from Vietnamese Ministry of Planning and Investment and other private sources about SEZs. The full dataset includes information about name, address, year of notification, area and main investor of the SEZ. A SEZ to operate needs to go through different stages: notification from the Central Government, preparation from the local government and operational stage. Not all notified SEZs become eventually operational. However, at the time of formal notification, preparation can begin, which may already affect the performance of firms. This is not too important in our context, as we have the exact address of firm whether they belong to a SEZ, so if their address has already shown that they are in a SEZ, it means this SEZ has been operated. In our dataset, SEZs that are expanded are also considered as newly zone established in this table (to account for the change in the area and they may have different investors in the SEZ and year expanded/ establised). Therefore, our number for total SEZs are higher than the total number from Vietnam Ministry of Planning and Investment. In addition, we consider SEZs as established when they are allowed by the national government/ local government to have the area specifically designed for the SEZs (regardless whether they already have the land, or build the infrastructure or not). We only take into account national-level economic zones, not including province-level economic zones (CCN) (¡75 ha, ¿10 ha; mostly small and medium enterprises, tax of 10% for 15 years). We also do not take into account the economic zones that are now (in 2023) no longer in the lists of the operational SEZs. For example, Tho Hoang economic zone was established with the permission from the national government. However, the local government proposed after (maybe around 5-10 years after), the economic zone does not work effectively or cannot attract the investment, or the focused industry is no longer suitable with the local government's economic strategy. Then the national government would consider and agree to remove this economic zone from the list of national-level economic zones. Note that: there would still be some firms already present in these economic zones though. We also do not take into account EPZs as SEZs due to their different goals and tax incentives compared to normal SEZs [9]

[9]It is important to note that among SEZs, they also have different tax incentives. Normal SEZs are

Regression Data.—Our sample includes firms from 2011-2019 period. In this period, some firms may be treated in the later years (located in SEZs in later years), some firms may be treated from the beginning (located in SEZs from the beginning - year 2011), and some firms will never be treated (never located in SEZs).

4.2 Variables

4.3 Summary Statistics

Table 2 shows the t-test to compare between SEZs firms (firms located in SEZs) and non-SEZs firms (firms not located in SEZs), as well as differentiate between foreign, domestic, and state firms. State firms include central, local, joint stock having state capital and collective. Domestic private firms include private enterprise, collective name, private having small state capital, joint stock not having state capital, joint stock having state capital ¡ 50%. And foreign firms are firms with 100% foreign capital, joint venture between state and foreign, joint venture between others and foreign.

	Within area (direct effects)				Within commune (indirect effects)			
	Nb of obs	SEZ firms	Nb of obs	Non-SEZ firms	Nb of obs	SEZ firms	Nb of obs	Non-SEZ firms
Average Number of employees	113,712	247.03	3,607,664	26.70	634,779	27.560	3,607,664	26.70
Average Revenue	113,712	276,955.3	3,603,041	31,539.7	634,779	25,957.07	3,603,041	31,539.7
Average Labour productivity (log)	98,518	4.417	3,147,169	3.799	562,100	3.662	3,147,169	3.799
Tax rate	111,965	0.043	3,515,857	0.045	621,697	0.038	3,515,857	0.045
Import-Export tax rate	7,191	0.149	23,727	0.025	2,907	0.015	23,727	0.025

Table 2: Comparison between SEZ firms and non-SEZ firms (direct and indirect effects)

Note: Table 2 compares the descriptive statistics for SEZ firms and non-SEZ firms within areas (direct effects) and within commune (spillover effects). Non-SEZ firms are the same for both within areas and within communes. SEZ firms within areas are defined as firms in a specific SEZ area (smaller than an area of a commune) and in the same commune before they enter into this area [10]. SEZ firms within commune are defined as firms within a commune that has one or more than one SEZs established, excluding firms in SEZ areas to distangle spillover effects. Average number of employees is the average number of employees at the end of the year. Share of workers with social security is calculated by using the number of employees with social security divided by total number of employees at the end of the year. Labour productivity is calculated by using value added divided by number of employees, in which we have value added by revenue of goods sold minus the cost of goods sold at the end of the year. We use a measure of TFP resulting from an OLS production function estimation that assumes Cobb-Douglas technology, with revenues as the output measure and total net assets (at the end of the year), number of employees (at the end of the year), and costs of goods sold as input measures for K, L, and M, respectively (Alfaro-Urena et al., 2022). Profit rate is calculated by using profit before tax minus total tax, and divided by revenue. We assume profit rate as missing if their value is smaller or equal to 0, or greater than 1. We have tax rate as total tax divided by revenue, import-export tax rate as import-export tax divided by revenue, VAT local tax rate as VAT local tax divided by revenue, and VAT import tax rate as VAT import tax divided by revenue. Similarly, we assume tax rate, import-export tax rate, VAT local tax rate, and VAT import tax rate as missing if their value is smaller or equal to 0, or greater than 1.

eligible for a corporate income tax rate of 20% for 10 years. SEZs located in open economic zones are eligible for a more favourable corporate income tax rate - similar to SEZs located in an area facing particularly difficult socio-economic challenges which is 10% for 15 years. If a district is given open economic area status, the whole district becomes a big SEZ for foreign investors. Some places got the status of an open economic area first and then got to set up state-level and province-level zones later on. This means an open economic zone might have a few smaller SEZs inside it. By 2020, Vietnam has 18 economic zones, all by the coastal line. On the other hand, districts away from the coast (inland areas) usually didn't get to be open economic areas.

4.4 The Model

Our study aims to assess the impact of SEZs on firm performance, particularly focusing on how SEZs establishments affect within firm located in SEZs areas and the spillover effects of SEZs establishment on firm performance in nearby areas, or within the same commune with the SEZs. Our identification strategy relies on one source of variation: spatiotemporal variation in SEZs establishments at the commune level. To achieve this, we employ a difference-in-difference analysis. This method involves comparing changes in outcomes of firms before and after the introduction of SEZs at certain communes (first difference) and measuring these changes against the trends observed at firms which did not have SEZs built. Therefore, we have two treated groups and one control group. The first treated group is the firms located in the SEZs areas - they are the ones that move into these newly built area of SEZs [11]. We use this group to measure the within firm effects of SEZs located in the SEZs areas. The second treated group is the firms located in the SEZs communes, excluding firms located in the SEZs areas. We use this group to measure the spillover effects of SEZs to firms nearby. Our control group is firms in the communes that do not have any SEZs establishment - or never treated group. Nevertheless, we also define different control groups (matched sample vs using not-yet treated and never treated group as our control groups) in our robustness check. Assuming parallel trends, our findings can be interpreted as the average treatment effect of SEZs on firms that located in the SEZ areas (direct effects) and on firms that nearby the SEZ areas (spillover effects). Our baseline analysis uses a specific version of the difference-in-difference estimator by Callaway and Sant'Anna (2021) [12]. The estimation is conducted in two main steps.

First, for each firm $i \in I$ that become treated in year t_i^* (firm moved to SEZ area in this year or SEZ established in this year), we construct event-study estimates of the effect of SEZs on outcome y_{it} (e.g., number of employees at firm i in year t (log), revenue of firm i in year t (log), labour productivity of firm i in year t (log), and TFP of firm i in year t). More

[11] These firms could be in the same commune or from a different commune or a newly established firm to locate in the newly established SEZs. In our context, we limit to the firms located in the same commune with the SEZ commune before it moved to the SEZ area. The reason we chose to limit to these firms is to distangle the effects that being in a SEZ changes firms' performance, and not due to the change in firms' locations - from less advantaged areas to a more advantaged area.

[12] The literature increasingly shows that interpreting estimates from traditional two-way fixed-effects regressions as average treatment effects (ATTs) can be challenging in scenarios like ours. This difficulty arises from variations in when treatments are applied and the likelihood of treatment effects varying over time and among different treated groups (Borusyak et al., 2021; Callaway and Sant'Anna, 2021; Goodman-Bacon et al., 2019). Nevertheless, we also report our estimates for two-way fixed-effects regressions in our Online Appendix.

specifically, we estimate the following event study specification:

$$y_{it} = \sum_{k=-3}^{3} \theta_k SEZ_{ki} + \alpha_i + \lambda_t + \epsilon_{it}, \tag{1}$$

where y_{it} is an outcome of firm i in calendar year t (Number of employees, Sales, Labour productivity). Starting from the event date for firm i τ_i (when the commune of firm i creates an SEZ), we define the event time dummies as $SEZ_{ki} := 1[t = \tau_i + k]$ for all $k \in (-3, 3)$. ϵ_{it} is an error term. We define the baseline year as the year before the event, therefore, we set $\theta_{-1} = 0$. α_i is a firm fixed effect, and λ_t is calendar year fixed effects. We cluster standard errors at the firm level.

Add above this the equation that corresponds to Table 3 (only one coefficient of interest)

Recent studies have highlighted that two-way fied effects regression produce reliable estimates only under stringent assumptions about the uniformity of treatment effects. There is a risk of bias if these effects vary over time or across different cohorts of adoption (De Chaisemartin and d'Haultfoeuille, 2020; Sun and Abraham, 2021; Goodman-Bacon et al., 2019; Callaway and Sant'Anna, 2021; Borusyak et al., 2021). For example, the agglomeration effects may take time to be, then the impact in the first year may be smaller than other later years. Or the later cohorts (firms entering into SEZs or SEZs located in later periods) could already learn the experiences from the earlier SEZs, then their treatment effects in the first years may be even larger than the earlier SEZs. Therefore, our research examines the dynamics of these treatments effects using the estimator by Callaway and Sant'Anna (2021). We also control for common 2-digit sector-by-province-by-year shocks. This estimator is valid under conditions including parallel trends and the absence of anticipation effects. In section **??**, we provide ore evidence to test these two assumptions for our baseline approach. In the appendix, we also compare our primary differences-in-differences and event study results, employing robust estimators from Sun and Abraham (2021) and traditional two-way fixed effects OLS methods.

5 Results

5.1 Within firms

5.1.1 Standard measures of firm performance

Firm sizes

Figure 2, top left and right panels, display the event study coefficients for log number of employees and log total sales. Notably, there is no evidence of selection into entering into SEZ conditional on 2-digit sector and province. Positive direct effects are observed in terms of sales, but not in number of employees. Firms increase their sales after entering into SEZs, while remain insignificant for number of employees. Additional details are provided in Table 3.

Measures of productivity

We begin by estimating labour productivity using value added [13] divided by number of employees at the end of the year for each firm i at time t. We then estimate Total Factor Productivity (TFP) using ordinary least squares (OLS), considering Cobb-Douglas function. We use log sales as the outcome variable and the logs of the number of assets, assets (as a proxy for capital), and input costs (as a proxy for materials) as time-varying controls, following TFP measures by previous literature (Alfaro-Urena et al., 2022). Figure 2, bottom left and right panels, present our event study figures for labour productivity and TFP results, with additional details provided in Table 4. Notably, firms that enter into SEZs show no prior trends on labour productivity or TFP growth. After entering into SEZs, firms show an increase on labour productivity and but not a clear trend on TFP.

Therefore, our preliminary results show that the direct effects of SEZs in Vietnam seem to be positive during this period from 2007-2019, as illustrated by using sales to measure SEZ's effectiveness on firm size and labour productivity for measures of productivity. Other measures (number of employees and TFP) show no statistically significant results after entering into SEZs compared to firms that never be in a commune with SEZs.

[13] We measure value added by using revenue minus input costs

Table 3: Main results

Dep var:	Number of employees		Sales		Labour productivity	
Treated group Effect	In SEZ direct	In commune indirect	In SEZ direct	In commune indirect	In SEZ direct	In commune indirect
Panel A. Control group is never-treated firms in non-neighboring communes, and the same 2-digit sector						
SEZ	-0.006	0.047	0.326***	0.134***	0.123***	0.031
	(0.048)	(0.025)	(0.073)	(0.041)	(0.061)	(0.047)
Obs	2,972,220	3,184,642	2,966,540	3,179,951	2,523,497	2,702,234
Panel B. Control group is never-treated firms in the cancelled SEZs						
SEZ	-0.041	0.067	0.559***	0.346***	0.439***	0.203
	(0.066)	(0.055)	(0.107)	(0.083)	(0.099)	(0.102)
Obs	114,308	426,243	112,977	425,821	96,899	366,182

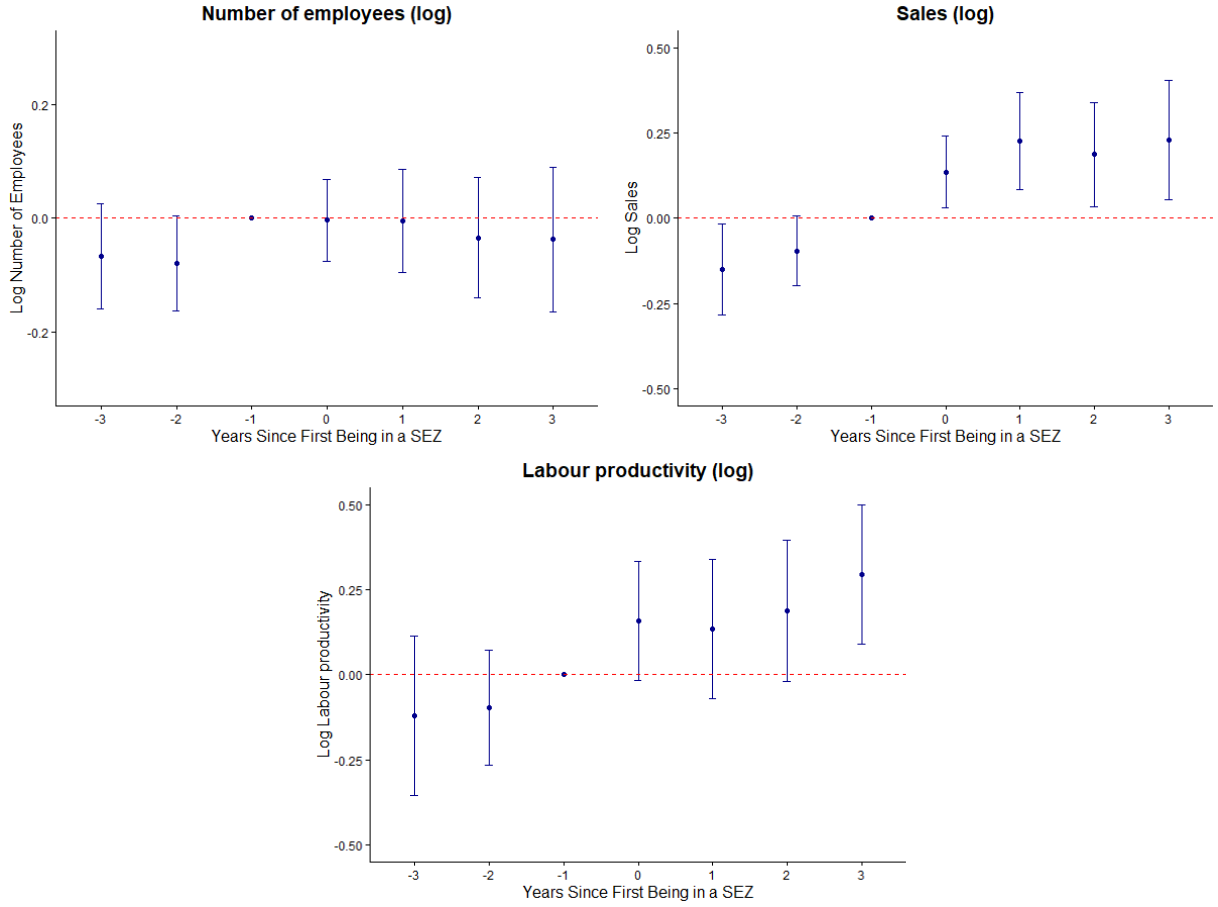


Figure 2: Sizes and measures of productivity indicators after entering into SEZ areas

Note: Figure 2 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity and a measure of TFP resulting from OLS production function estimation, under the Cobb-Douglas functional form assumption. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established). The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero, conditioning on 2-digit sector and province for parallel trends. The vertical lines represent 95% confidence intervals.

5.2 Within communes - Spillover effects

5.2.1 Standard measures of firm performance

Firm sizes
Figure 3, top left and right panels, display the event study coefficients for log number of employees and log total sales. Additional details are provided in Table 3.

Measures of productivity Figure 3, bottom left and right panels, present our event study figures for labour productivity and TFP results, with additional details provided in Table 3.

Therefore, our preliminary results show that the results of spillover effects of SEZs in Vietnam seem to be limited during this period from 2007-2019, as illustrated by using number of employees, labour productivity and TFP. However, sales show a positive result. Firms in the communes with SEZs increase their sales at year t+1 by 11% and at year t+3 by 9.8% compared to the baseline year.

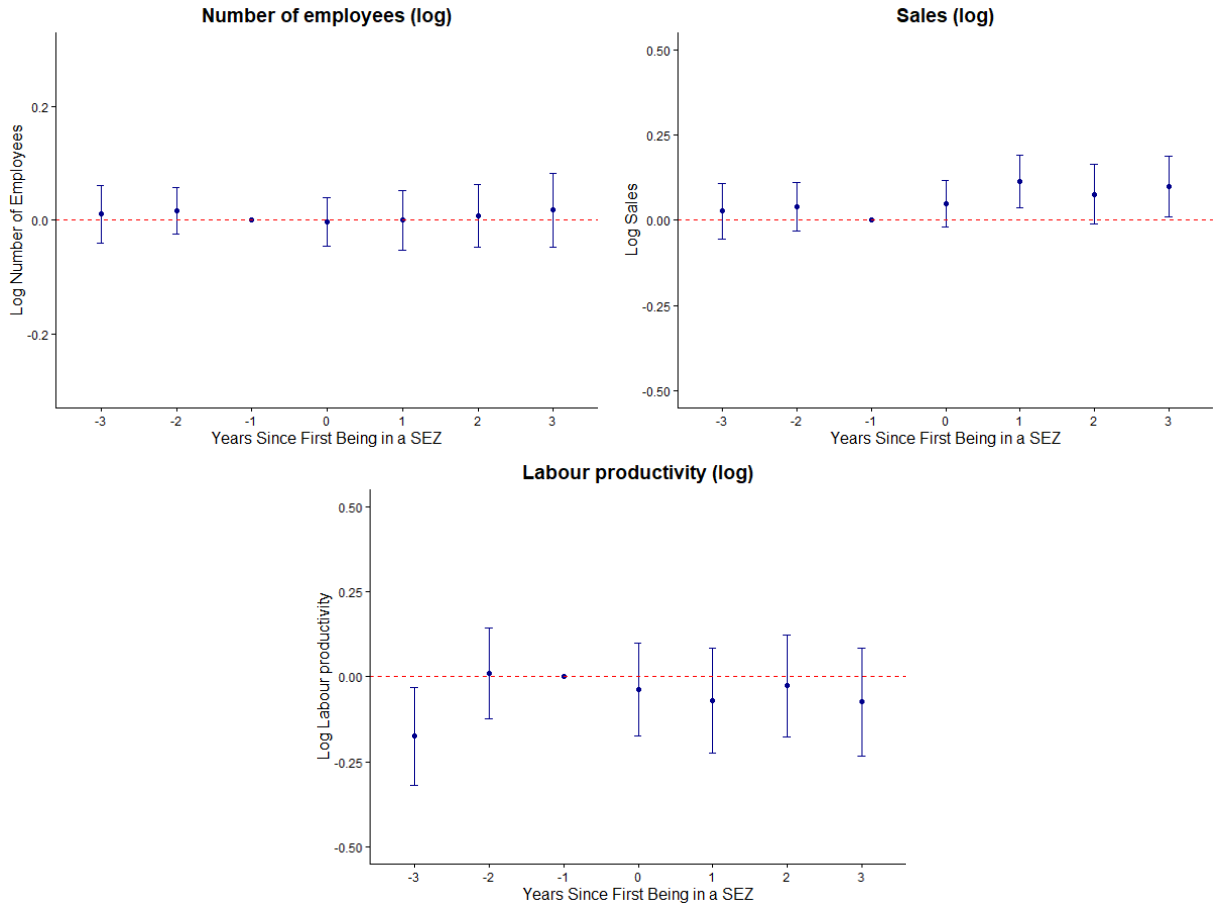


Figure 3: Sizes and measures of productivity indicators after SEZ establishment in a commune

Note: Figure 3 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity and a measure of TFP resulting from OLS production function estimation, under the Cobb-Douglas functional form assumption. The event is defined as when a SEZ was established in a commune. The control group is never treated firms (firms located in a commune in which there's never a SEZ established). β_{-1}, the coefficient of the year prior to a first SEZ established in a commune, is normalized to zero, conditioning on 2-digit sector and province for parallel trends. The vertical lines represent 95% confidence intervals.

5.3 Robustness check

5.3.1 Alternative empirical strategies - Using propensity score matching and event study

Firms enter into SEZs are on average with better performance indicators than firms not in SEZs (either areas or in the same communes), as described in summary statistics 2. Not only there exists a selection bias of firms entering into SEZs, there is also a selection bias of where SEZs areas are established, as discussed in section 3.2. Therefore, we implement the

Table 4: Baseline Analysis - need to update

	Within areas (direct effects)				Within commune (spillover effects)			
	Nb of employees	Total sales	Labour productivity	TFP	Nb of employees	Total sales	Labour productivity	TFP
3 years before event	0.028	0.065	-0.130	0.125	0.008	0.021	-0.157*	0.033
	(0.021)	(0.034)	(0.056)	(0.097)	(0.019)	(0.030)	(0.049)	(0.059)
2 years before event	0.026	0.022	-0.048	0.102	0.016	0.037	0.026	0.020
	(0.016)	(0.025)	(0.052)	(0.065)	(0.014)	(0.025)	(0.043)	(0.036)
Year of event	-0.0001	0.017	-0.077	-0.045	-0.002	0.042	-0.037	-0.109
	(0.017)	(0.027)	(0.057)	(0.159)	(0.015)	(0.024)	(0.046)	(0.141)
1 year after event	0.003	0.069	-0.092	-0.088	-0.003	0.110*	-0.059	-0.112
	(0.019)	(0.031)	(0.056)	(0.137)	(0.016)	(0.029)	(0.047)	(0.141)
2 years after event	0.003	0.030	-0.107	-0.062	0.007	0.075	-0.014	-0.101
	(0.019)	(0.032)	(0.054)	(0.138)	(0.017)	(0.028)	(0.047)	(0.135)
3 years after event	0.007	0.047	-0.152	-0.164	0.018	0.098*	-0.073	-0.172
	(0.024)	(0.036)	(0.055)	(0.095)	(0.021)	(0.033)	(0.048)	(0.107)
Nb obs	3,446,557	3,441,329	2,929,222	2,473,920	3,437,020	3,431,818	3,283,562	2,463,657

standard propensity score matching.

From a set of never treated firms, we select a group of comparison firms C_i that match firm i on a vector of baseline covariates X_{it}. We estimate the propensity score that firm i is being in a SEZ in year t. We estimate a year-by-year flexible probit model for our sample where $D_i = 1$ if firm i is located in a SEZ area and 0 for never-treated firms. X_{it} includes pre-treatment covariates including dummies of two-digit sector, dummies whether it is a foreign firm, private firm, or state firm. We also include mean sales and mean number of employees two years prior to the event. Online Appendix Table 18 reports the results of our probit regression using three nearest neighbors with replacement. We then run an event study from equation 1 using Callaway and Sant'Anna (2021)'s approach again to compare the outcomes of treated firms to those of firms in their personalized control group.

Table 5 presents the event study estimates obtained from the propensity score matching described above. Table 5 focuses on our main outcomes including: number of employees, total sales, labor productivity, and TFP residual from an OLS production function estimation under a Cobb-Douglas technology.

5.3.2 Alternative empirical strategies - Using different control groups: firms in cancelled SEZs

We compare between firms located in SEZ areas to firms located in the communes which have no SEZ establishment, conditioning on two-digit sectors and province as our baseline analysis. However, if there are unobserved factors influencing the total spillover size and

Table 5: Propensity Score Matching Analysis need to update

	Within areas (direct effects)				Within commune (spillover effects)		
	Nb of employees	Total sales	Labour productivity	TFP	Nb of employees	Total sales	Labour productivity
3 years before event	-0.324	-0.079	-0.142*	NA	NA	NA	NA
	(0.138)	(0.264)	(0.202)	(NA)	(NA)	(NA)	(NA)
2 years before event	-0.132	-0.147	-0.006	-0.361	-0.002	0.048*	-0.047
	(0.065)	(0.107)	(0.125)	(0.165)	(0.039)	(0.028)	(0.151)
Year of event	-0.014	0.211	-0.088	-0.049	0.033	0.070*	-0.082
	(0.052)	(0.084)	(0.086)	(0.054)	(0.032)	(0.025)	(0.089)
1 year after event	0.007	0.291*	0.027	0.018	0.026	0.114*	0.087
	(0.065)	(0.093)	(0.091)	(0.068)	(0.040)	(0.032)	(0.091)
2 years after event	0.018	0.189	0.295*	0.046	0.089	0.057*	0.049
	(0.059)	(0.106)	(0.096)	(0.066)	(0.041)	(0.035)	(0.088)
3 years after event	0.021	0.282	0.406*	-0.251*	0.081	0.047*	0.114
	(0.069)	(0.112)	(0.097)	(0.062)	(0.050)	(0.037)	(0.100)
Nb obs	24,432	24,314	21,310	18,559	263,769	263,630	233,251

subsidy amount from SEZs, if correlated with firms' size and productivity, would result in misspecified regression models due to omitted variables.

To draw valid inferences considering this heterogeneity, it's essential to know the exact selection criteria for why firms enter into SEZs and why SEZs are established. However, these factors are usually unknown or hard to measure. We address this identification problem by using alternative empirical strategy - using firms in cancelled SEZ as our control group. The SEZ establishment is usually signed and approved by the Central Government before it is finally built and established. However, sometimes, the Central Government will notify a cancelation plan on some notified SEZs. It means these SEZs are never established in reality - we call it from now on cancelled SEZs. We search data using thuvienphapluat.vn related to cancelled SEZs which which features official government documents which SEZs are cancelled. We use firms located in these cancelled SEZs to estimate what would have happened to firms size and productivity in the SEZ communes without SEZ establishent. Even if imperfect, this pairwise approach is presumed as an alternative empirical strategy to using event study alone conditioning on 2-digit sector and province. The results are illustrated in figure 3 panel C. We find the results are similar to our main results - suggesting that our baseline results seem to reflect true effects.

5.3.3 Alternative measures of SEZ

We conducted several additional robustness checks to verify the fi ndings. First, some counties in the sample have more than one SEZ, and the land area varies across zones. These variations are not captured in the dummy variable for whether a county hosts an SEZ. In

Table 5, columns 1 and 2 repeat equation (1) using alternative measures for SEZs—the total number of SEZs and the total area of SEZs in each county, respectively. The estimates confirm that SEZs have positive and statistically significant effects on local educational outcomes.

5.3.4 Exclude four star cities

Second, we excluded the four star cities — Ho Chi Minh, Danang, Hanoi, which are municipalities directly under the central government. Each of these cities hosts more than ten state- and province-level SEZs. Since they are home to large interest groups with strong political power, these cities might be favored for various kinds of resources other than SEZs (Chen, Henderson, and Cai 2017). This phenomenon may generate omitted variable problems. Column 3 of Table 5 reports the DIDM estimator in terms of the treatment effect obtained by dropping counties in these star cities. The magnitude of the SEZ effect size (0.0308) is identical to that in the primary estimation result (column 4 of panel B in Table 2).

5.3.5 Exclude processing traders

In column ...., we exclude processing traders from our sample to alleviate the concern that our findings may be driven by changes in the trading regime upon Vietnam's accession to the WTO. Clearly, our estimates barely change in statistical significance and magnitude, suggesting that a possible change in the trading regime is not the main driver of our findings.

5.3.6 Controlling for the WTO accession effect

To examine whether our findings can be explained by the WTO accession that Vietnam has in 2007, we include tax changes as a control to isolate the effect of the SEZ presence. The results reported in column ... in table ... show that adding this control barely changes our main results; that is, SEZ remains statistically significant and around 0. These results suggest that our findings do not come from the WTO accession effect.

5.3.7 Anticipation effect

Callaway and Sant'Anna (2021) allow us to have anticipation effect, etc.

5.3.8 Violation of parallel trends

5.4 Heterogeneous Effects

5.4.1 By types of SEZs

All types of SEZs offer a favorable tax policy for firms operating there. However, there are several dimensions that these SEZs' types are different from each other as explained in the background. Therefore, in this part, we will analyze the effects of different types of SEZs on our interested outcomes, including employment, labor productivity, revenue and TFP.

Table 6: Heterogeneity Results: By types of SEZs

	Number of employees		Sales		Labour productivity	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
Direct	Indirect					
Panel A. Only Industrial parks						
SEZs	0.006	0.142***	0.286	0.213***	0.112	0.024
	(0.121)	(0.044)	(0.044)	(0.074)	(0.118)	(0.074)
Obs	3,157,841	2,935,201	3,152,018	2,930,795	2,715,092	2,488,333
Panel B. Only Border zones						
SEZs	-0.253***	0.053	0.064	0.129	0.130	-0.070
	(0.102)	(0.077)	(0.162)	(0.14)	(0.149)	(0.203)
Obs	3,102,018	2,756,810	3,097,226	2,752,559	2,635,089	2,336,067
Panel C. Only Economic zones						
SEZs	0.184	0.070	1.087***	-0.258	0.172	-0.221
	(0.185)	(0.080)	(0.515)	(0.165)	(0.197)	(0.295)
Obs	3,150,638	2,944,586	3,100,814	2,966,949	2,638,126	2,494,761
Panel D. Only Provincial zones						
SEZs	-0.090	-0.046	0.180	0.123***	0.029	0.082
	(0.010)	(0.034)	(0.150)	(0.056)	(0.047)	(0.064)
Obs	3,120,672	3,175,555	3,115,744	3,170,694	2,651,039	2,692,873

Only Industrial parks

First of all, the results for industrial parks SEZs are illustrated in figure 4. For a regression with only industrial parks, the results seem to be similar to our baseline results. There is no change in terms of number of employees, sales, and labour productivity after firms enter into SEZs. However, the TFP for industrial parks only increase after two years of the event, and

then not statistically significant after, hence, the result seems to be in short-term only[14].

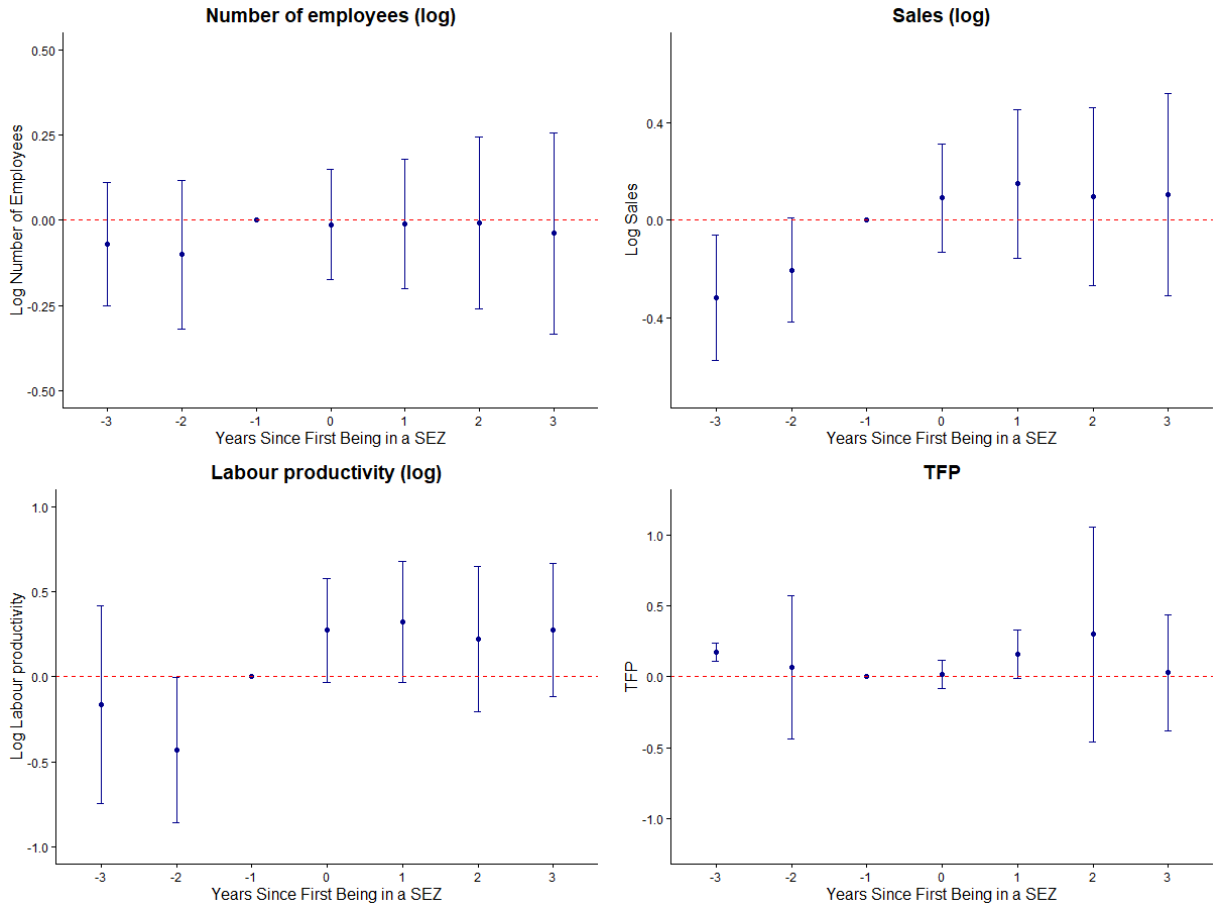


Figure 4: By type of SEZs - Only industrial parks - Direct Effects

Note: Figure 4 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity and a measure of TFP resulting from OLS production function estimation, under the Cobb-Douglas functional form assumption. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only industrial parks. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [15]. The vertical lines represent 95% confidence intervals.

[14]Our results for sales and TFP for industrial parks only may violate parallel trends as coefficients before the event are statistically different from 0.

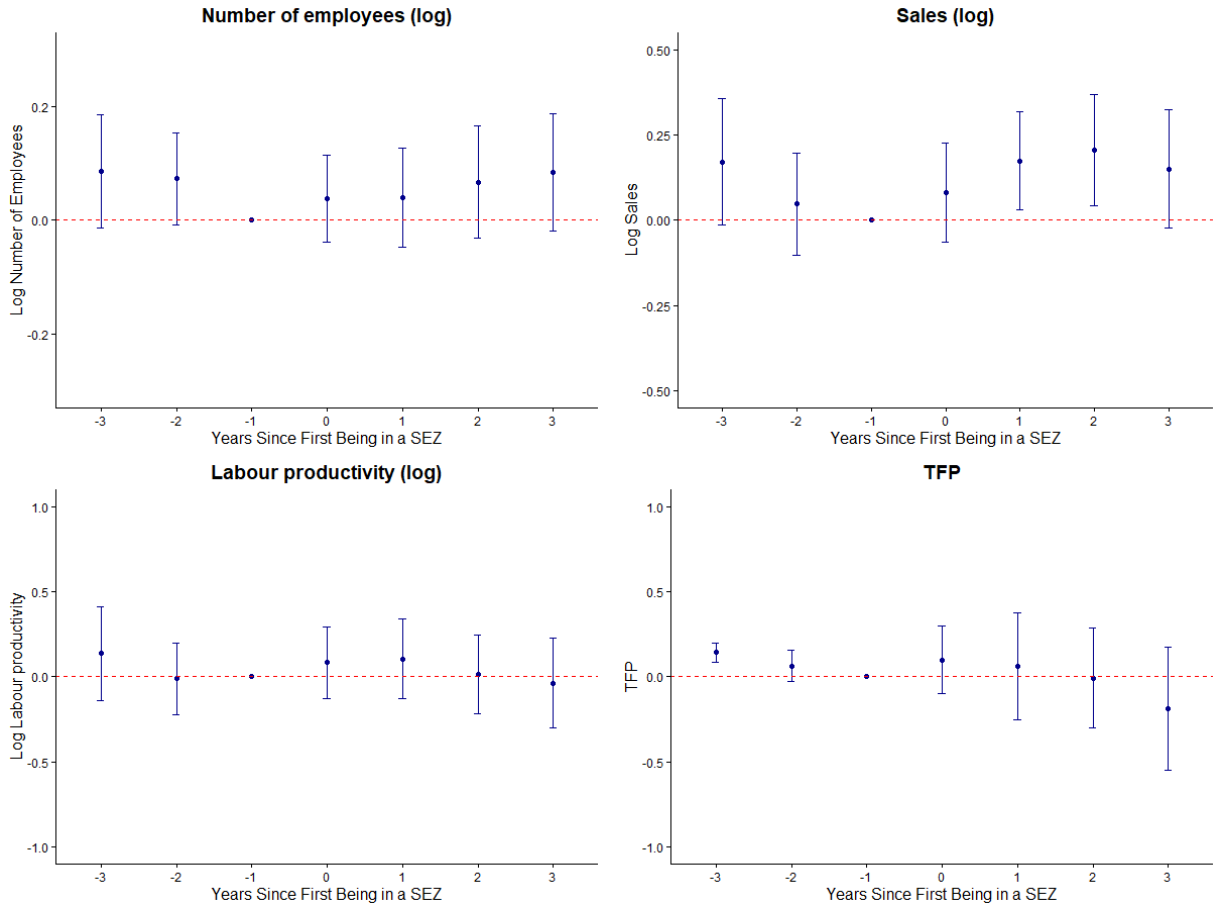


Figure 5: By type of SEZs - Only industrial parks - Spillovers

Note: Figure 4 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity and a measure of TFP resulting from OLS production function estimation, under the Cobb-Douglas functional form assumption. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only industrial parks. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [16]. The vertical lines represent 95% confidence intervals.

Only Border zones

The results for border zones are illustrated in figure 6. Firms in border zones decrease their number of employees after entering into border zones around 29% at year t+1, and 34% at year t+3, and both are statistically significant. This result is big in magnitude, but also makes sense as border zones are not supposed to attract firms and improve firms performance, but rather to help in terms of free customs tax for exchanging goods with border countries. Sales do not change after entering into SEZs although the coefficients are positive at the year of the event and at year t+1, but negative after. However, all coefficients are not statistically significant for us to say any meaningful conclusion for sales after entering into SEZs with only order zones. For labour productivity, we do see their labour productivity increase at the year of the event to around 43%, the coefficients for t+1 to t+3 are positive, but not

statistically significant.

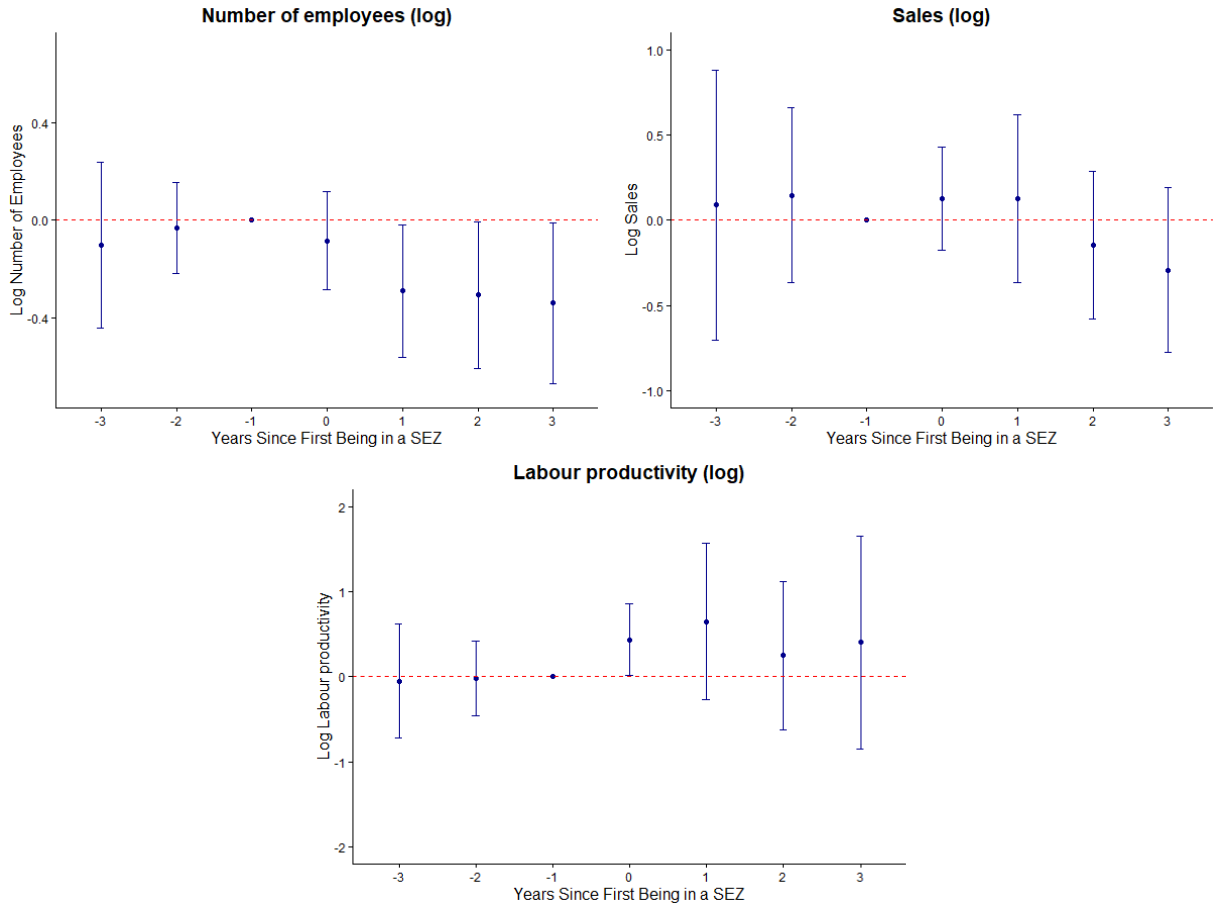


Figure 6: By type of SEZs - Only border zones - Direct Effects

Note: Figure 6 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only border zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [17]. The vertical lines represent 95% confidence intervals.

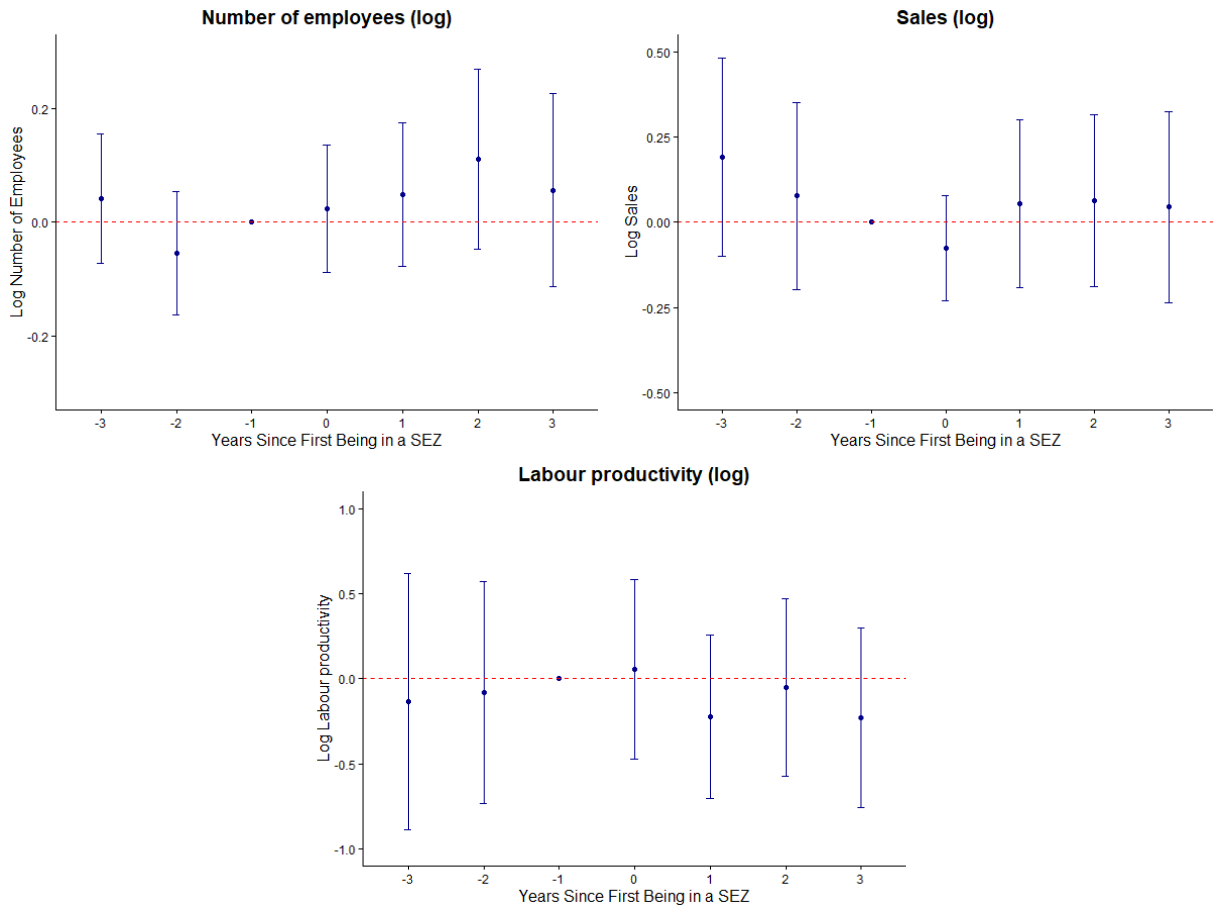


Figure 7: By type of SEZs - Only border zones - Spillovers

Note: Figure 7 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only border zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [18]. The vertical lines represent 95% confidence intervals.

Only Economic zones

The economic zones (or coastal economic zones) are larger areas which not only to attract manufacturing firms, but also to promote tourism and services in these zones. Figure 8 illustrate these results in log number of employees, log total sales and labor productivity. The results are in line with our baseline results. We do not see any difference in number of employees after firms entering into SEZs compared to firms never in a SEZ. This is the same for labour productivity. All the coefficients after (and before) entering into SEZs are statistically insignificant, although for labour productivity in economic zones, the coefficients are positive (rather than negative as our baseline result). Log total sales's coefficient 2 years after the event is positive. It means that after entering into SEZ, at t+2, firms increase their sales by 7.6 %.

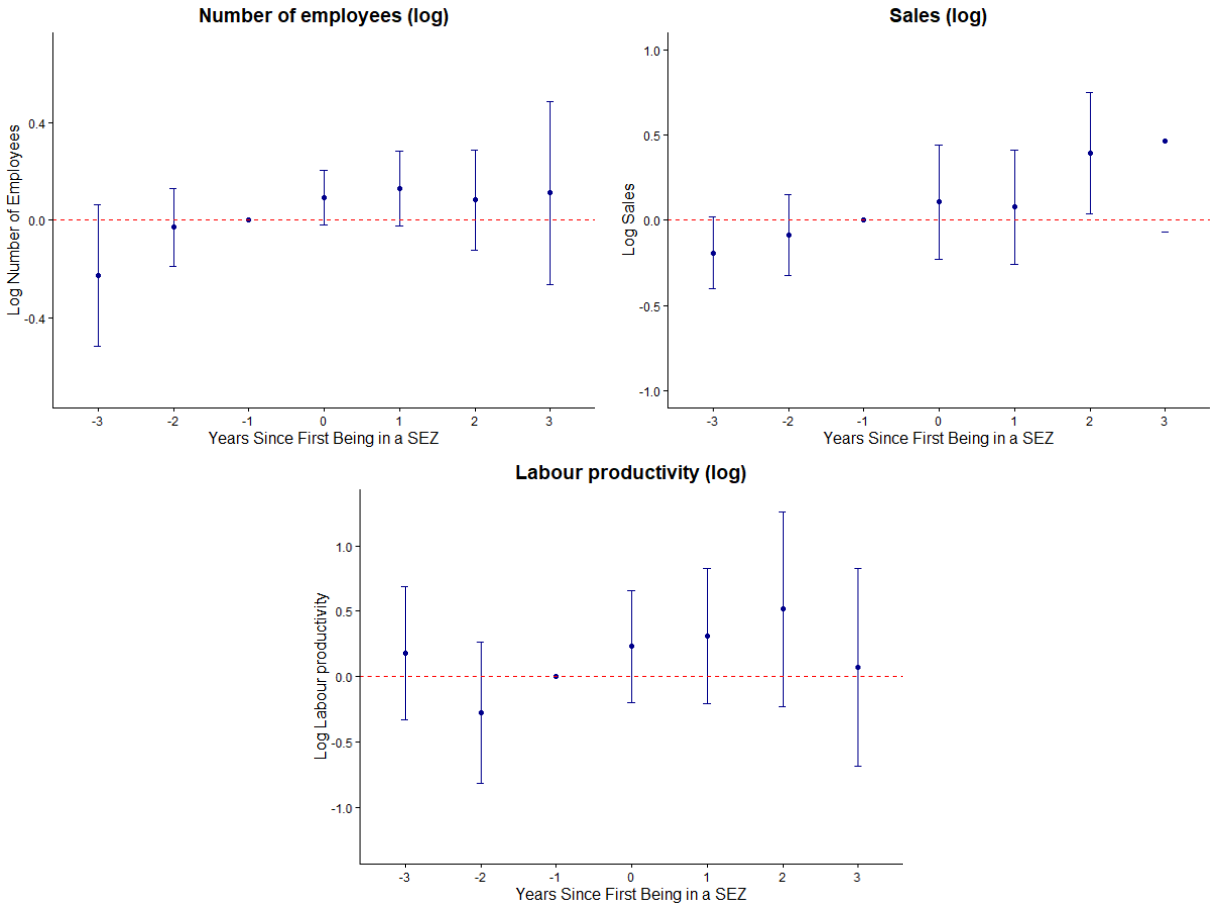


Figure 8: By type of SEZs - Only economic zones - Direct Effects

Note: Figure 8 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only coast economic zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [19]. The vertical lines represent 95% confidence intervals.

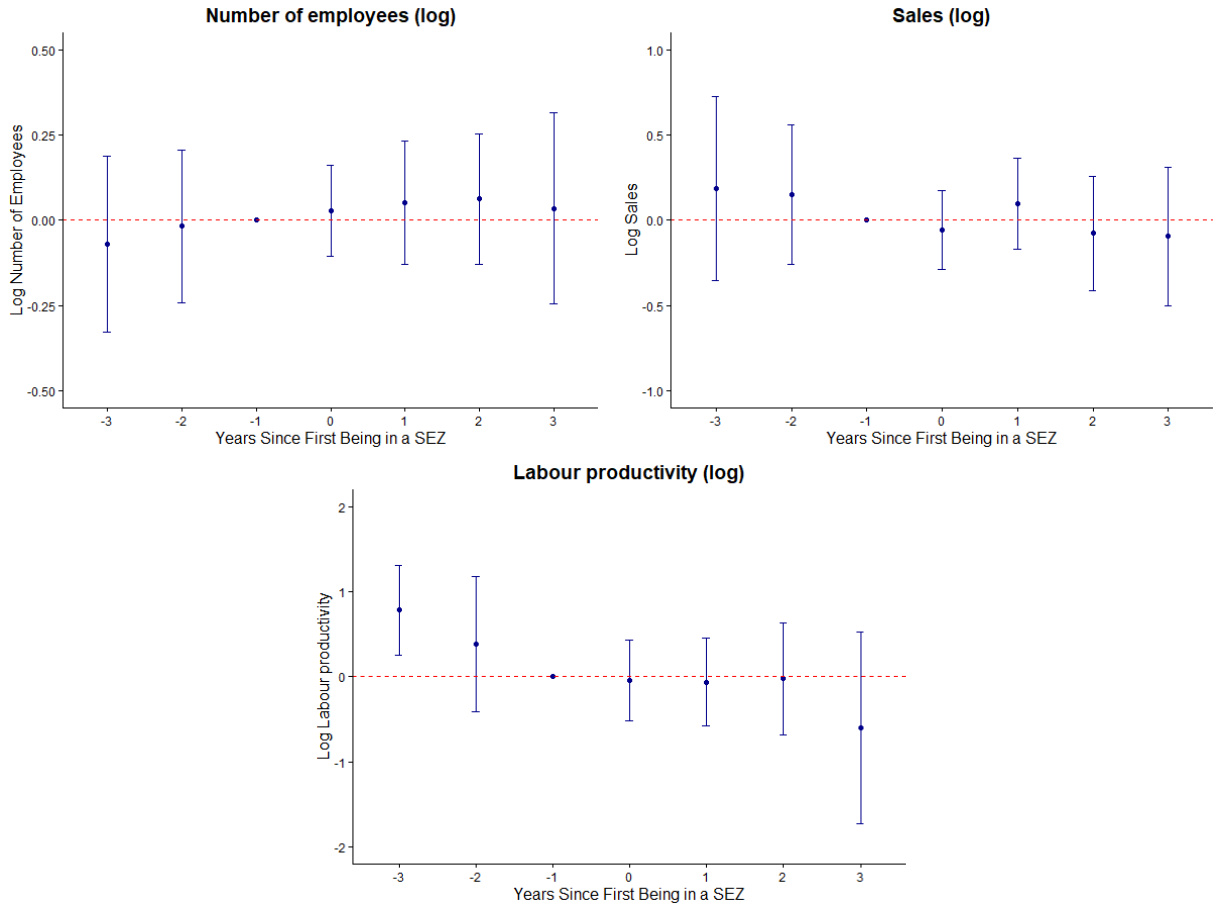


Figure 9: By type of SEZs - Only economic zones - Spillovers

Note: Figure 9 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only coast economic zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [20]. The vertical lines represent 95% confidence intervals.

Only Provincial zones

Figure 10 show the results for provincial economic zones. The results align with our baseline analysis when we do not see any difference in number of employees, in total sales, and in labour productivity [21].

[21]The results for labour productivity might violate pre-trends as the coefficient at t-3 is diferent from 0 statistically.

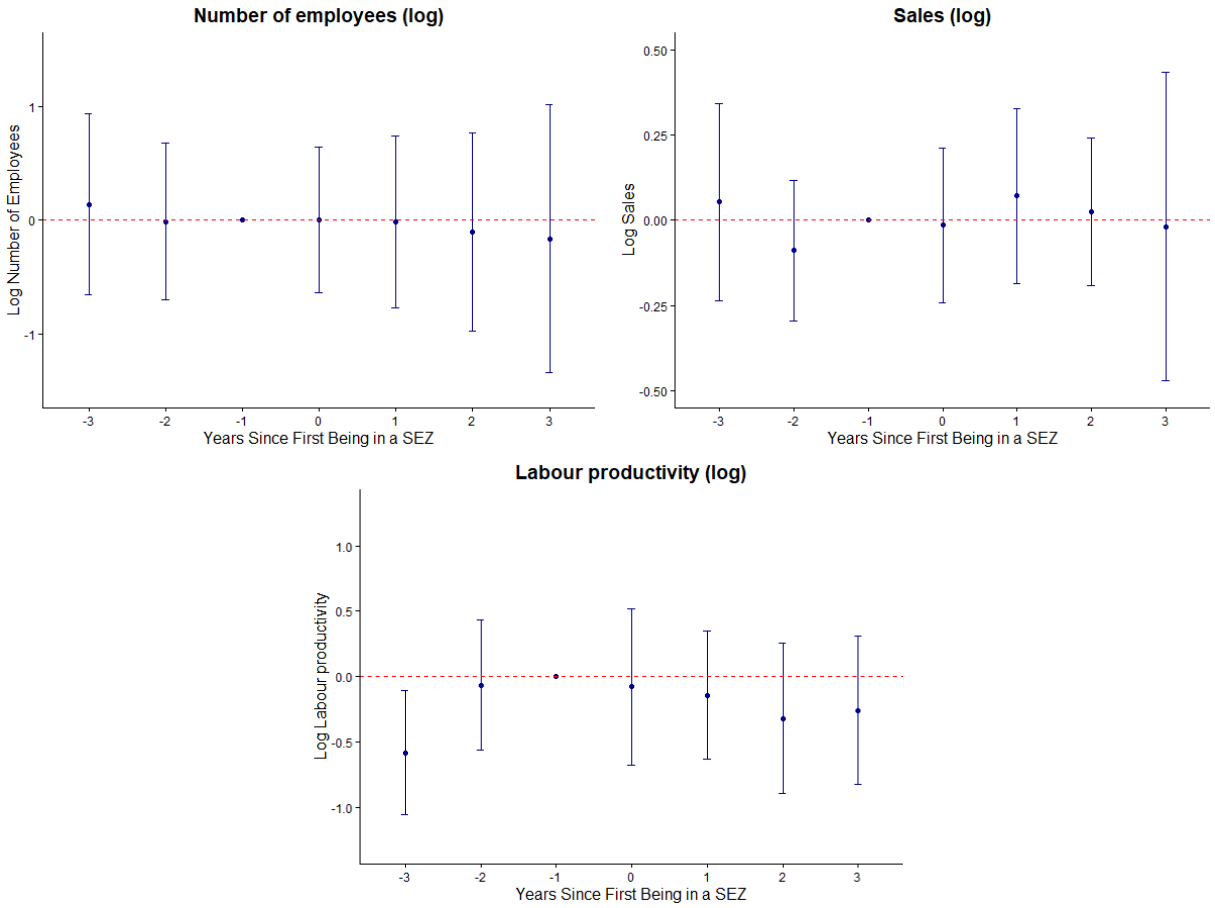


Figure 10: By type of SEZs - Only Provincial zones - Direct Effects

Note: Figure 10 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only provincial zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [22]. The vertical lines represent 95% confidence intervals.

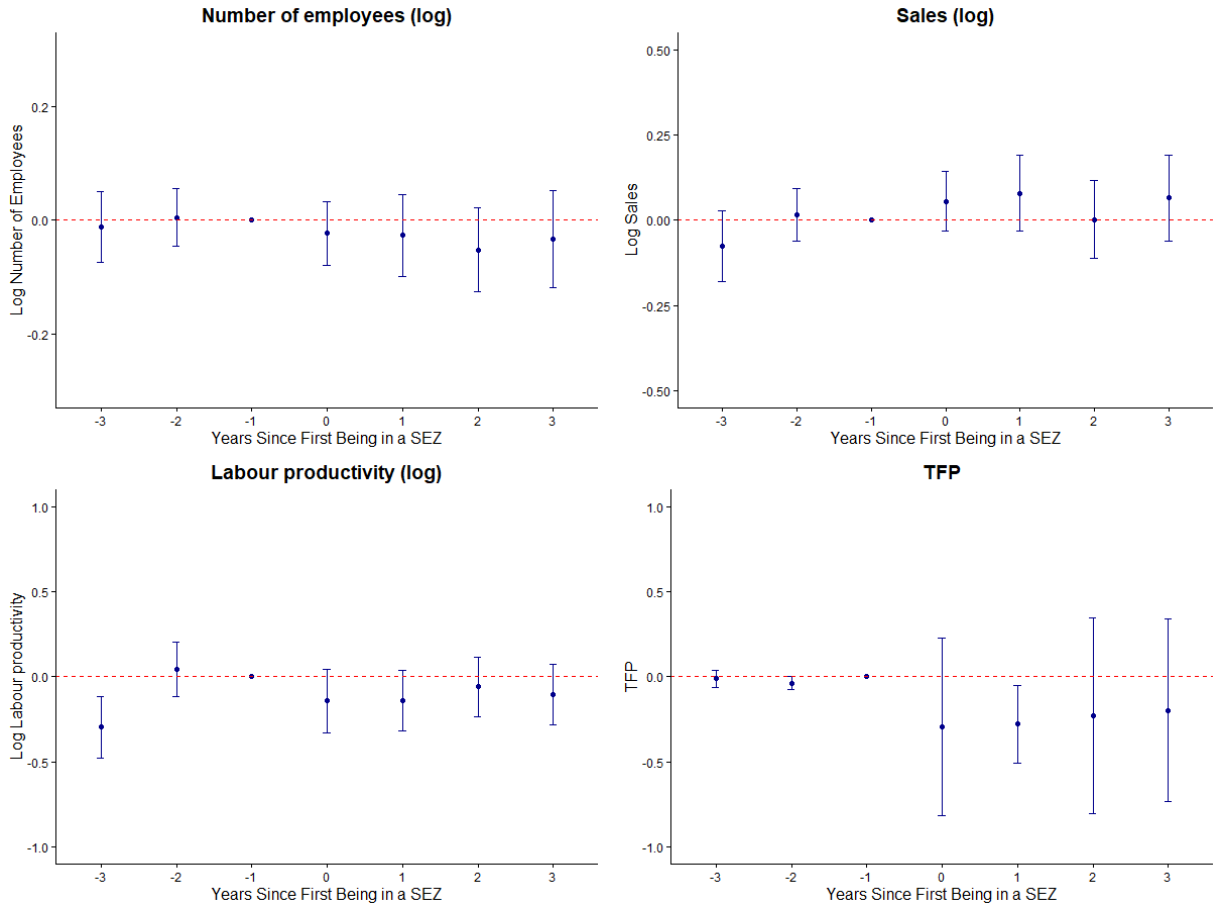


Figure 11: By type of SEZs - Only Provincial zones - Spillovers

Note: Figure 11 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only provincial zones. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [23]. The vertical lines represent 95% confidence intervals.

5.4.2 By firm sizes

Firm sizes could be another dimension of heterogeneity, especially in the case of Vietnam where very small and small firms account for more than 90% number of firms. We divide into 4 types of firms, according to the standard division of the government [24]. Very small firms are firms with smaller than 10 employees, small firms are firms with number of employees between 10 and 100, medium firms are firms from 100-200 employees, and big firms are firms with more than 200 employees.

[24]The regulation based on firm sizes is Decree 80/2021/ND-CP. Although the decree also considers revenue as another criteria to divide firm sizes, in this paper, we take into account number of employees at the end of the year for firms only.

Table 7: Heterogeneity Results: By firm sizes

	Number of employees		Sales		Labour productivity	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
Panel A. Only Very small firms						
SEZs	-0.037	0.078***	-0.040	0.105	-0.290	-0.066
	(0.081)	(0.029)	(0.152)	(0.067)	(0.223)	(0.088)
Obs	1,922,844	2,103,575	1,921,565	2,122,145	1,607,116	1,758,435
Panel B. Only Small firms						
SEZs	-0.178***	0.0007	0.218***	0.058	0.104	0.067
	(0.056)	(0.035)	(0.099)	(0.054)	(0.080)	(0.062)
Obs	1,108,972	1,136,285	1,108,295	1,135,669	964,511	986,909
Panel C. Only Medium firms						
SEZs	0.071	0.036	0.319	0.105	-0.013	0.063
	(0.111)	(0.125)	(0.181)	(0.179)	(0.191)	(0.170)
Obs	81,019	72,027	80,669	71,736	71,305	63,296
Panel D. Only Big firms						
SEZs	0.143	0.002	0.147	0.083	0.284***	0.047
	(0.172)	(0.108)	(0.219)	(0.116)	(0.125)	(0.131)
Obs	83,479	65,606	79,709	62,883	72,160	56,077

Only Very Small firms

Figure 12 illustrates the effects of SEZ establishment on employment, labor productivity and sales for very small firms. We do not see any different effects after firms enter into SEZs for log number of employees, log total sales and labour productivity.

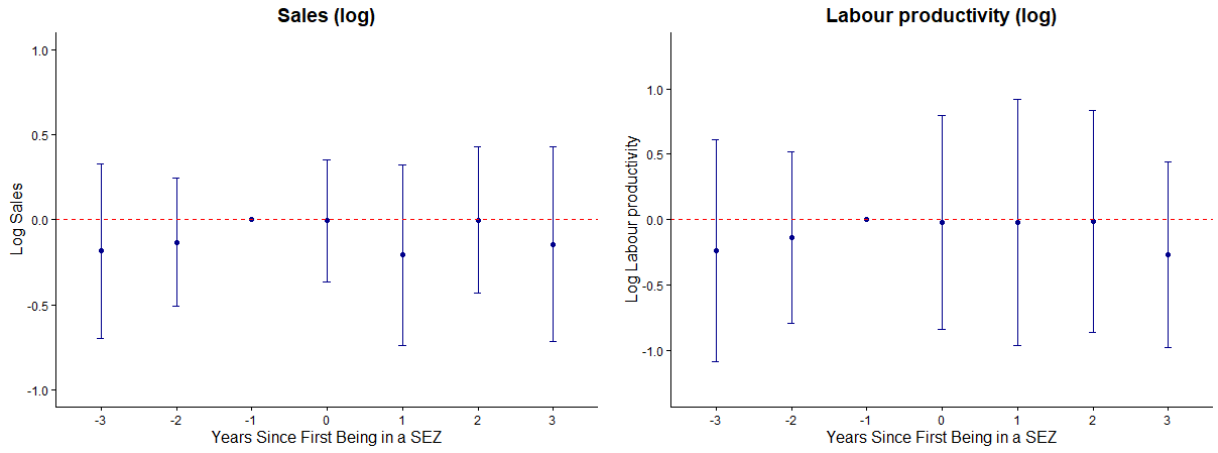


Figure 12: By firm sizes - Only very small firms (Number of employees no more than 10) - Direct Effects

Note: Figure 12 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only very small firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [25]. The vertical lines represent 95% confidence intervals.

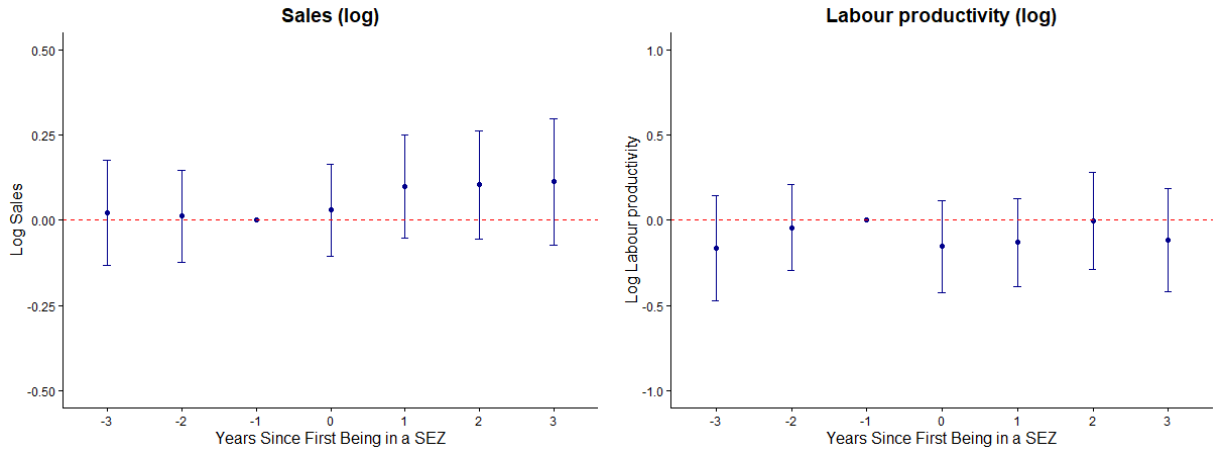


Figure 13: By firm sizes - Only very small firms (Number of employees no more than 10) - Spillovers

Note: Figure 13 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only very small firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [26]. The vertical lines represent 95% confidence intervals.

Only Small firms

Figure 14 illustrates the effects of SEZ establishment on employment, labor productivity and sales for small firms. The effects from small firms are similar to what we observe in aggregate trend. We do not see any difference in terms of number of employees, sales, and labour productivity (all in log) after firms enter into SEZs. This is not surprising, since majority of firms in Vietnam are small firms.

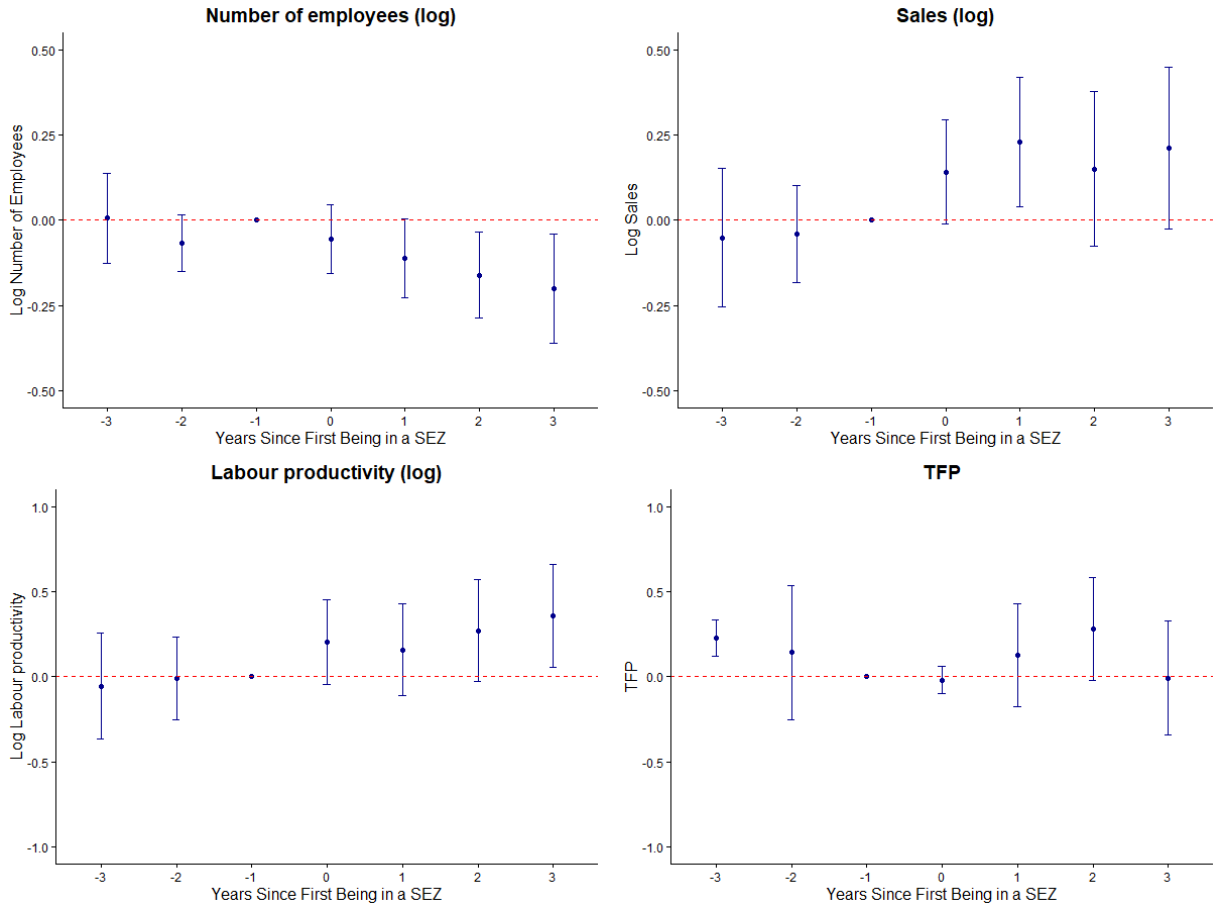


Figure 14: By firm sizes - Only small firms (Number of employees from 10 to no more than 100) - Direct Effects

Note: Figure 14 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only small firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [27]. The vertical lines represent 95% confidence intervals.

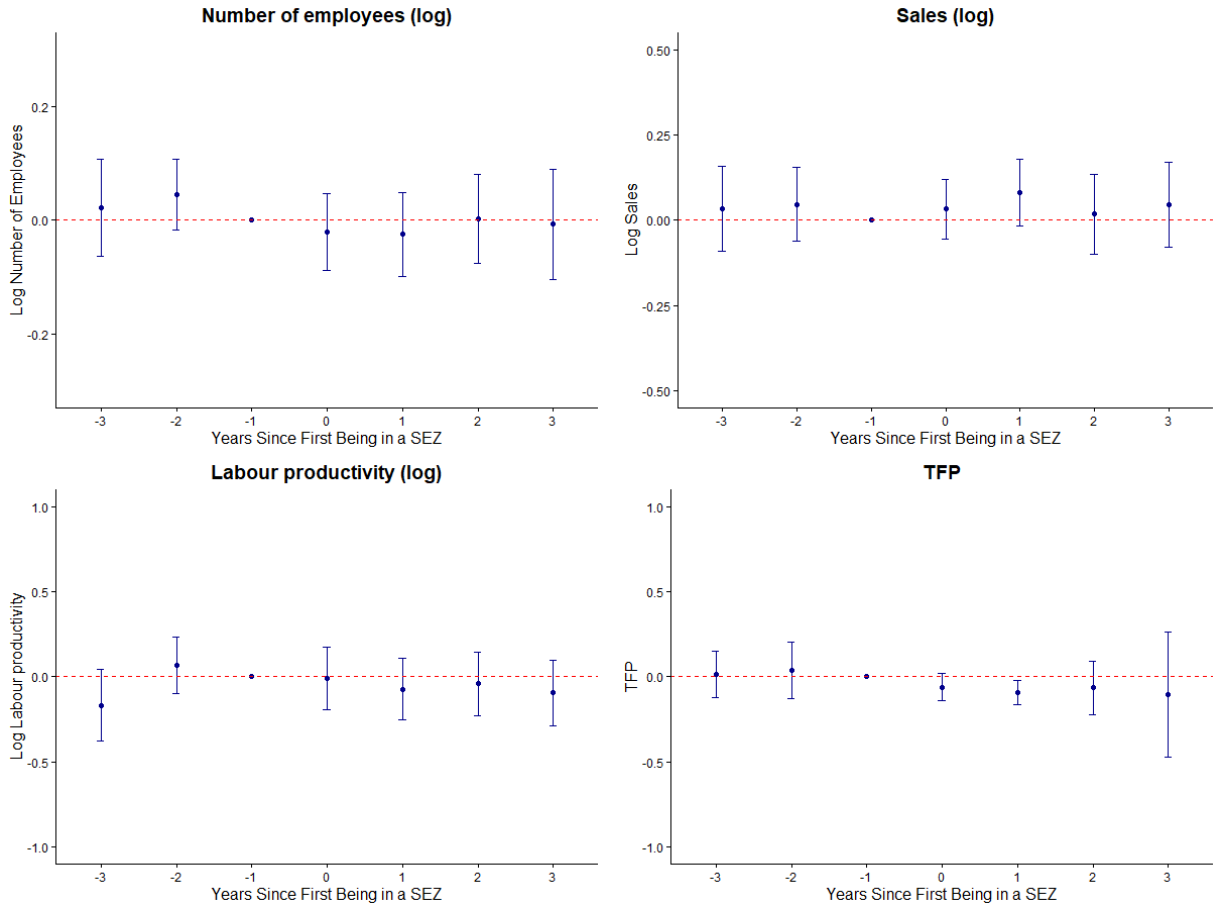


Figure 15: By firm sizes - Only small firms (Number of employees from 10 to no more than 100) - Spillovers

Note: Figure 15 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only small firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [28]. The vertical lines represent 95% confidence intervals.

Only Medium firms

For medium firms with number of employees from 100 to no more than 200, our results also align with our baseline results, with no effects on number of employees, sales, and labour productivity after firms enter into SEZs.

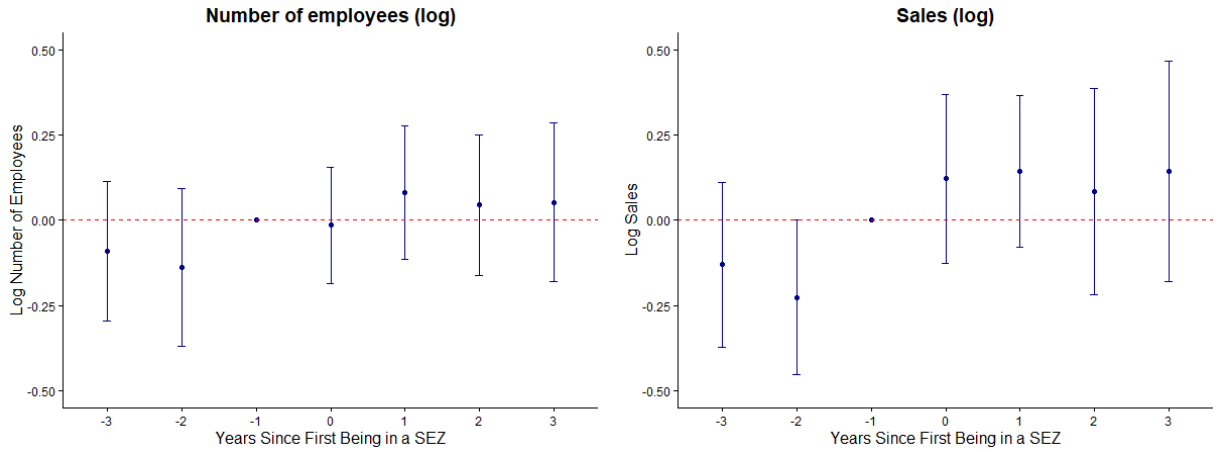


Figure 16: By firm sizes - Only medium firms (Number of employees from 100 to no more than 200) - Direct Effects

Note: Figure 16 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only medium firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [29]. The vertical lines represent 95% confidence intervals.

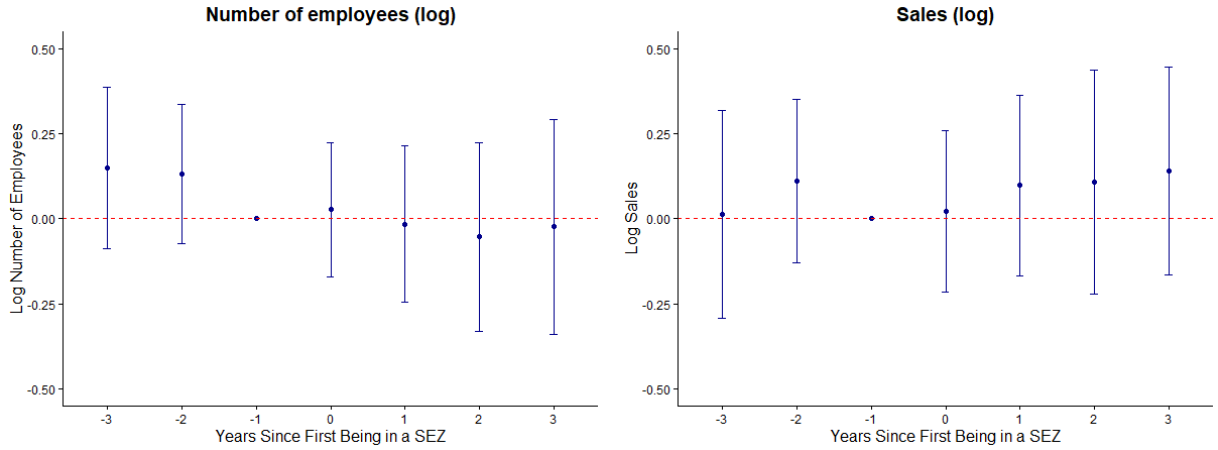


Figure 17: By firm sizes - Only medium firms (Number of employees from 100 to no more than 200) - Spillovers

Note: Figure 17 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only medium firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [30]. The vertical lines represent 95% confidence intervals.

Only Big firms

Results for big firms with number of employees more than 200 are similar to what we found for the aggregate effect in terms of number of employees and sales. However, for big firms, we do see an increase in labour productivity at year t+2 and year t+3. At year t+2, labour

productivity increase by 20.49 % and at year t+3, it increase by 22.46 % compared to our baseline year.

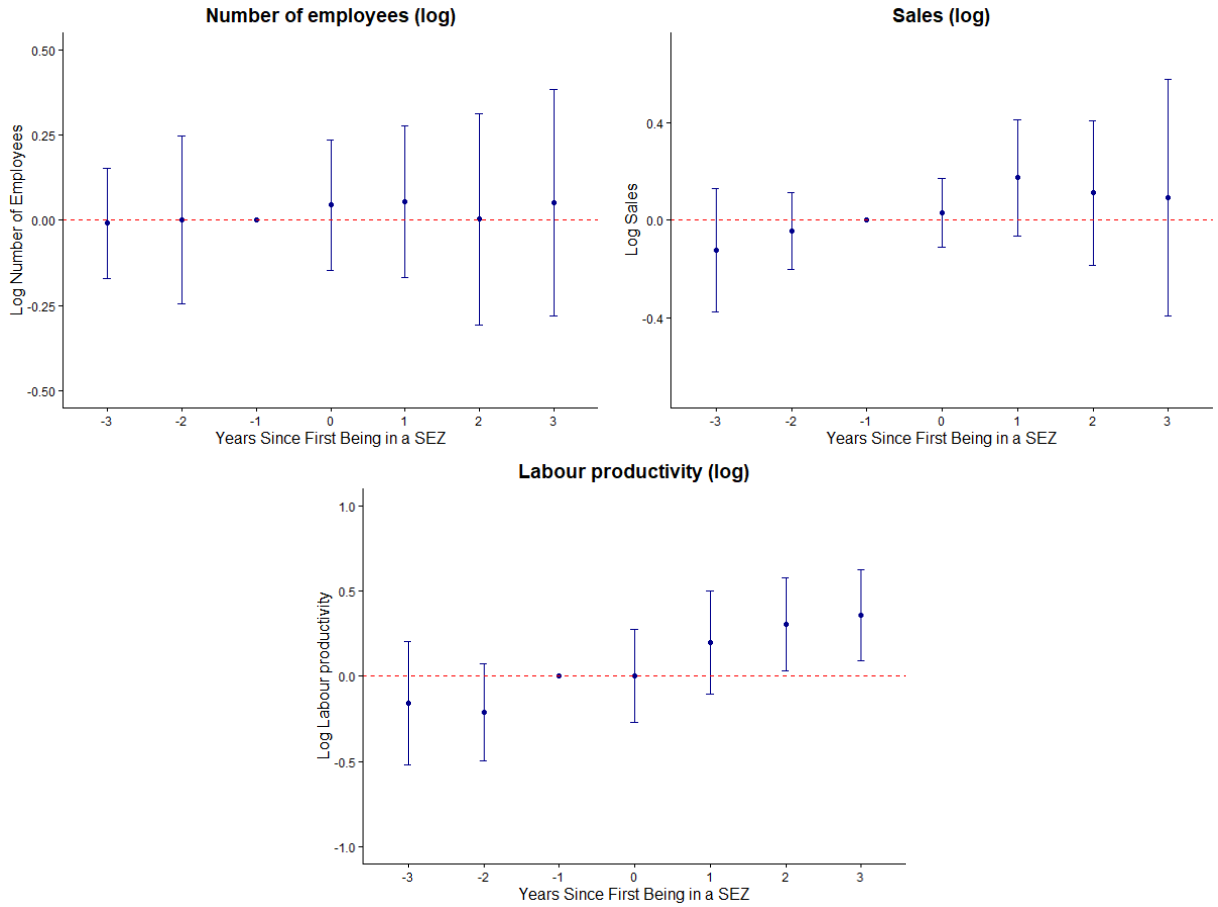


Figure 18: By firm sizes - Only big firms (Number of employees more than 200) - Direct Effects

Note: Figure 18 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only big firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [31]. The vertical lines represent 95% confidence intervals.

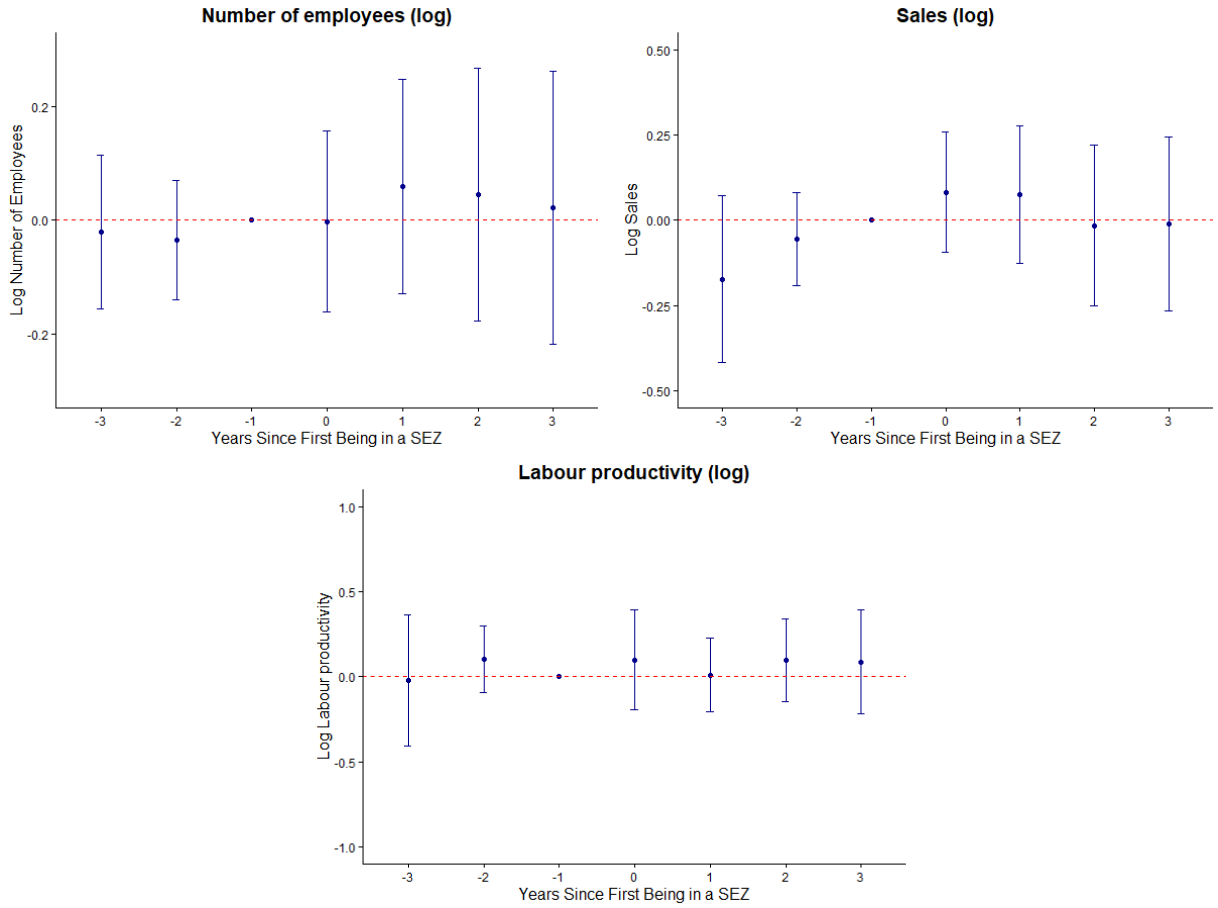


Figure 19: By firm sizes - Only big firms (Number of employees more than 200) - Spillovers

Note: Figure 19 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only big firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [32]. The vertical lines represent 95% confidence intervals.

5.4.3 By types of firms

We argue from the beginning, how SEZs may affect firms'outcomes compared to non-SEZs firms are because of the type of firms that they are trying to attract (multinational firms) and the agglomeration effect. In our dataset, we could distinguish between types of firms, including foreign, private domestic, and state domestic firms. We will test whether when we limit to only foreign firms, or only private domestic firms, or only state domestic firms - the results will be similar or different.

Only Foreign firms

As shown in figure 20, when we limit to only foreign firms in our treated and control groups,

Table 8: Heterogeneity Results: By types of firms

	Number of employees		Sales		Labour productivity	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
Panel A. Only Foreign firms						
SEZs	0.158	-0.283***	0.533***	-0.186	0.351	-0.270
	(0.134)	(0.135)	(0.210)	(0.160)	(0.204)	(0.223)
Obs	97,852	65,189	96,052	64,297	81,172	53,589
Panel B. Only Private domestic firms						
SEZs	-0.092	0.041	0.257***	0.127***	0.104	-0.021
	(0.059)	(0.027)	(0.084)	(0.047)	(0.067)	(0.052)
Obs	2,979,131	3,187,167	2,976,180	3,184,283	2,528,060	2,700,547
Panel C. Only State domestic firms						
SEZs	-0.024	0.171***	0.601	0.287***	-0.112	0.115
	(0.146)	(0.060)	(0.748)	(0.113)	(0.094)	(0.124)
Obs	111,013	116,940	109,779	115,736	98,534	103,877

we do not see any difference for number of employees, sales, and labour productivity after firms enter into SEZs. This might suggest that even within subsidiaries of multinational firms (foreign firms), there is no difference of entering into SEZs compared to firms never been into SEZs. This questions the effectiveness of attracting foreign investment into SEZs.

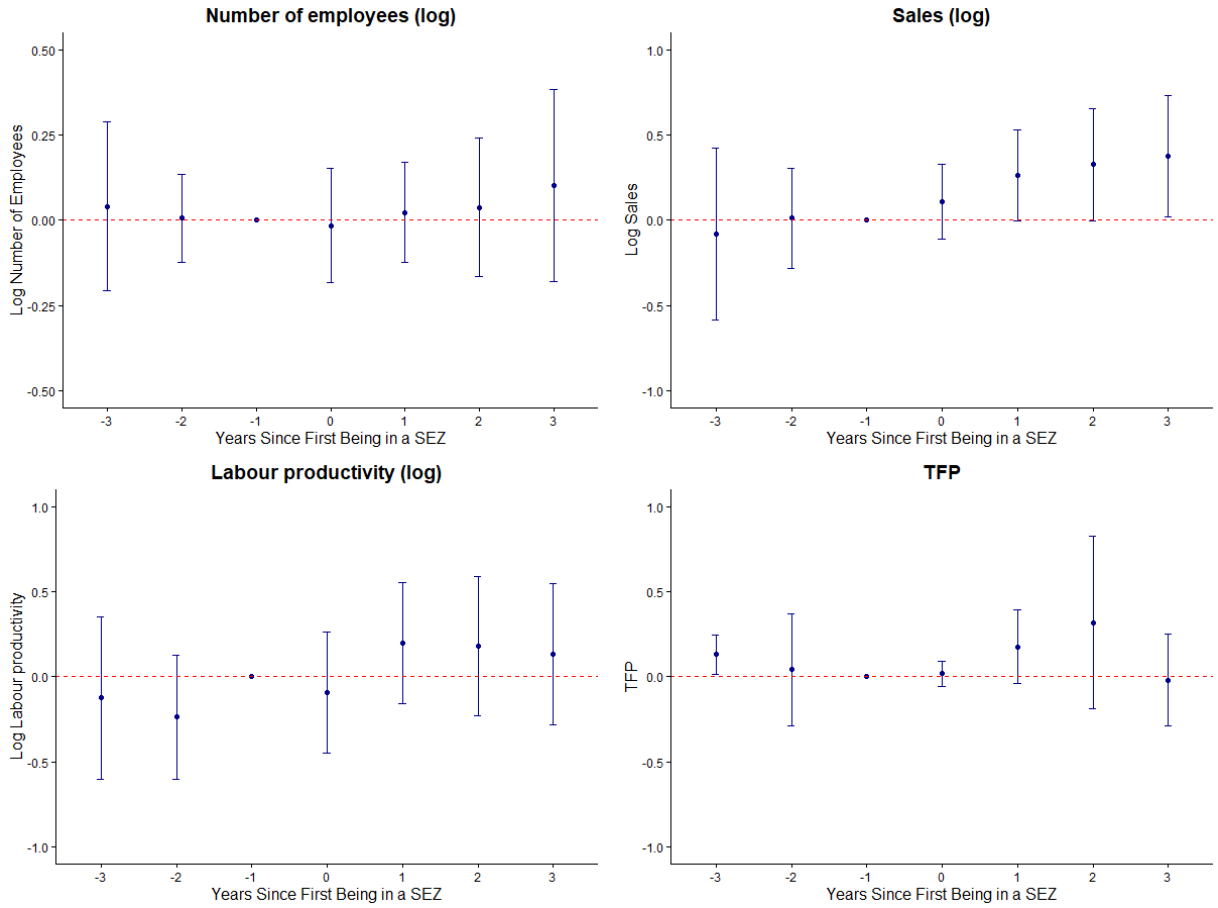


Figure 20: By types of firms - Only foreign firms - Direct Effects

Note: Figure 20 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only foreign firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [33]. The vertical lines represent 95% confidence intervals.

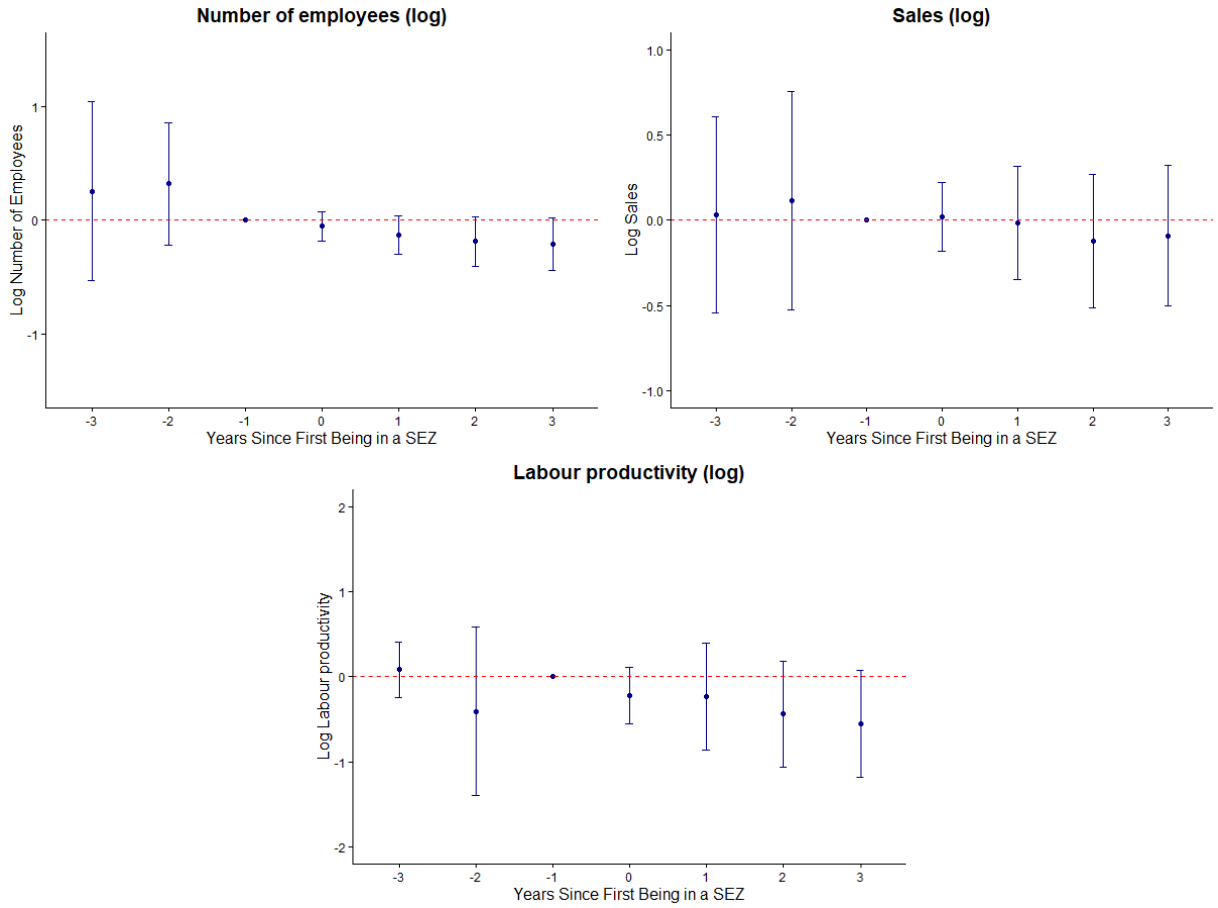


Figure 21: By types of firms - Only foreign firms - Spillovers

Note: Figure 21 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only foreign firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [34]. The vertical lines represent 95% confidence intervals.

Only Private Domestic firms

Figure 22 illustrates results for private domestic firms only, and they show a similar trends for employment and labour productivity [35]. We do see an increase in total sales at year t+1, when firms enter into SEZs increase their sales by 9.9% compared to the baseline year, but the results at year t+2 and t+3 are not statistically significant and positive.

[35]We might violate pre-trends for regression with labour productivity where the coefficient at year t-3 is different from 0.

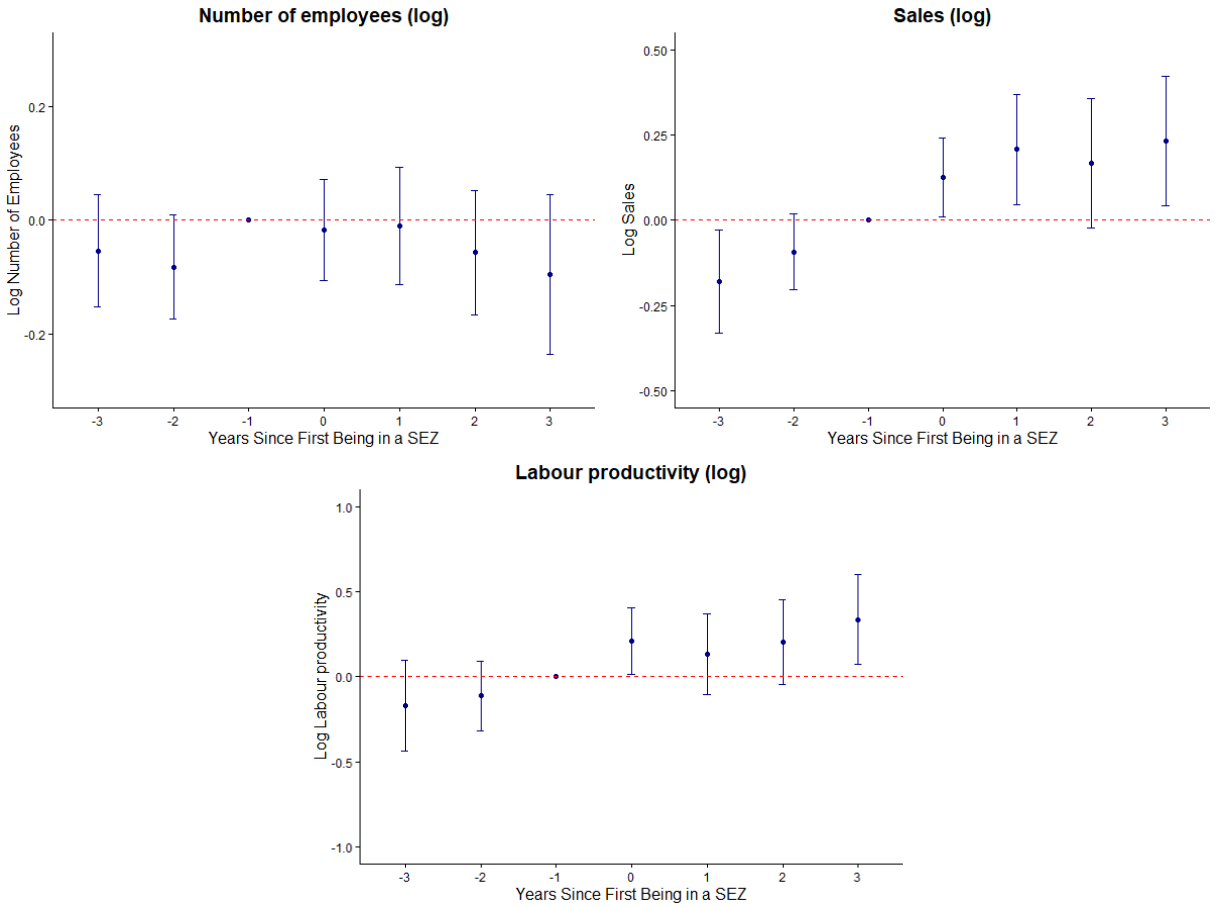


Figure 22: By types of firms - Only private domestic firms - Direct Effects

Note: Figure 22 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only private domestic firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [36]. The vertical lines represent 95% confidence intervals.

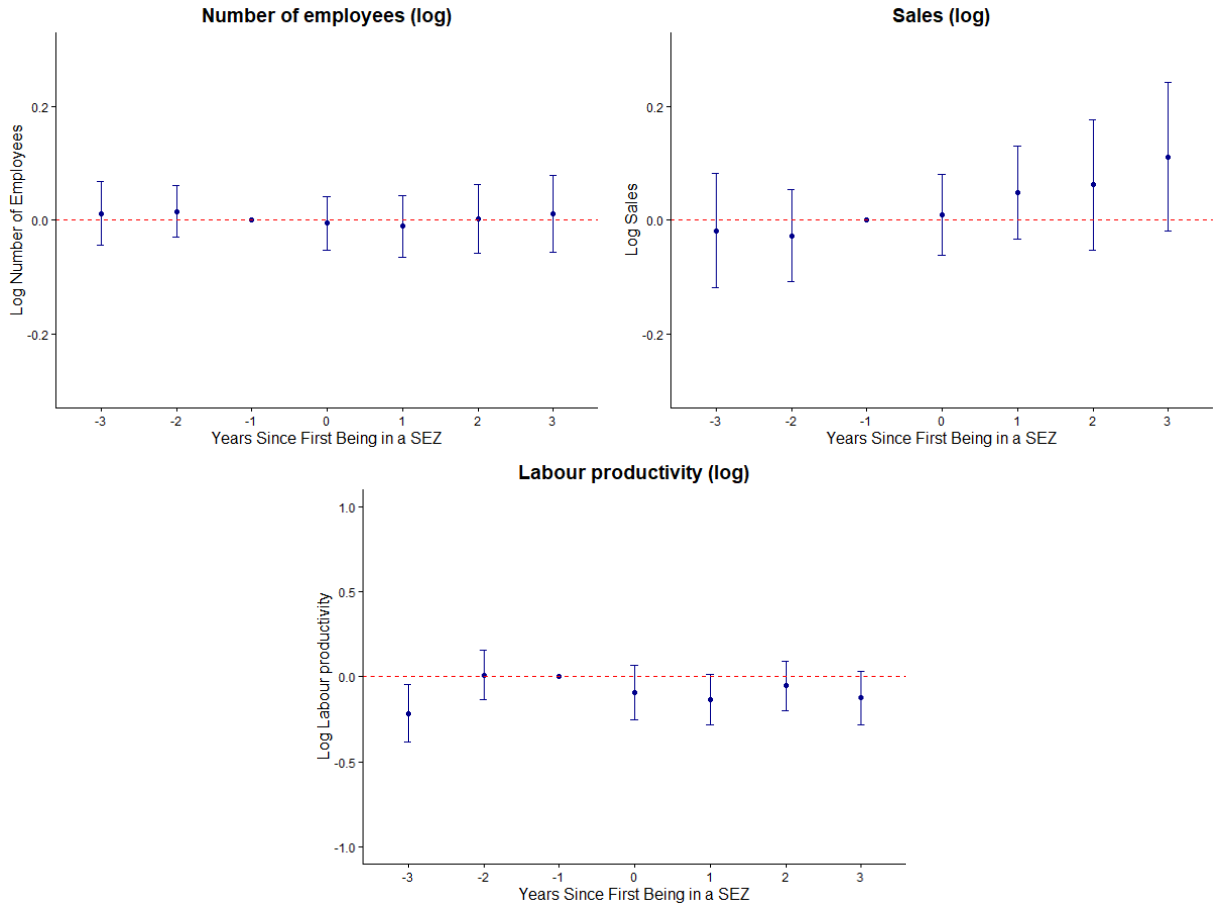


Figure 23: By types of firms - Only private domestic firms - Spillovers

Note: Figure 23 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only private domestic firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [37]. The vertical lines represent 95% confidence intervals.

Only State Domestic firms

Figure 24 illustrates results for state domestic firms only. We see a similar trend for employees and labour productivity. However, for total sales, we see an increase of around 39% and 28% at year t+1 and year t+2. These coefficients are statistically significant at these two time periods.

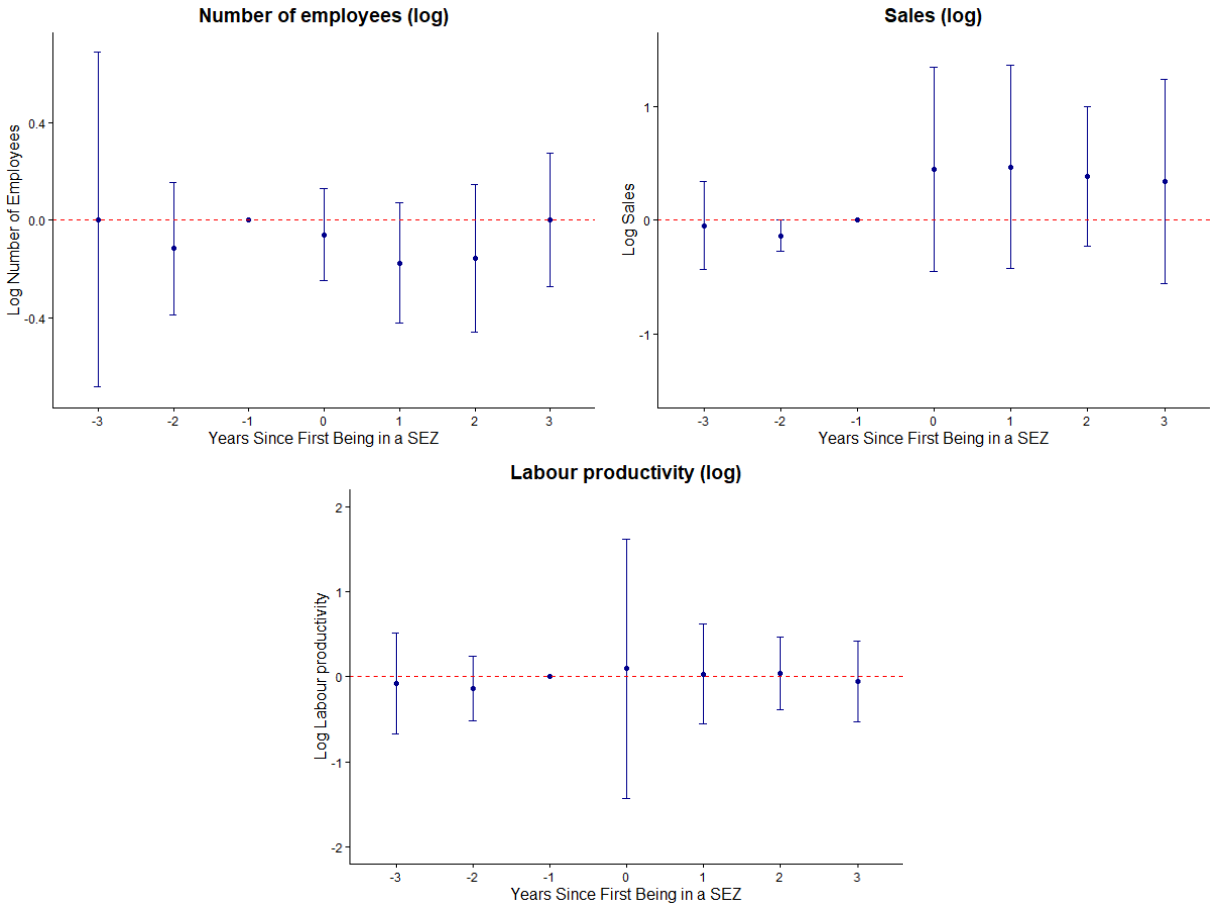


Figure 24: By types of firms - Only state domestic firms - Direct Effects

Note: Figure 24 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only state domestic firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [38]. The vertical lines represent 95% confidence intervals.

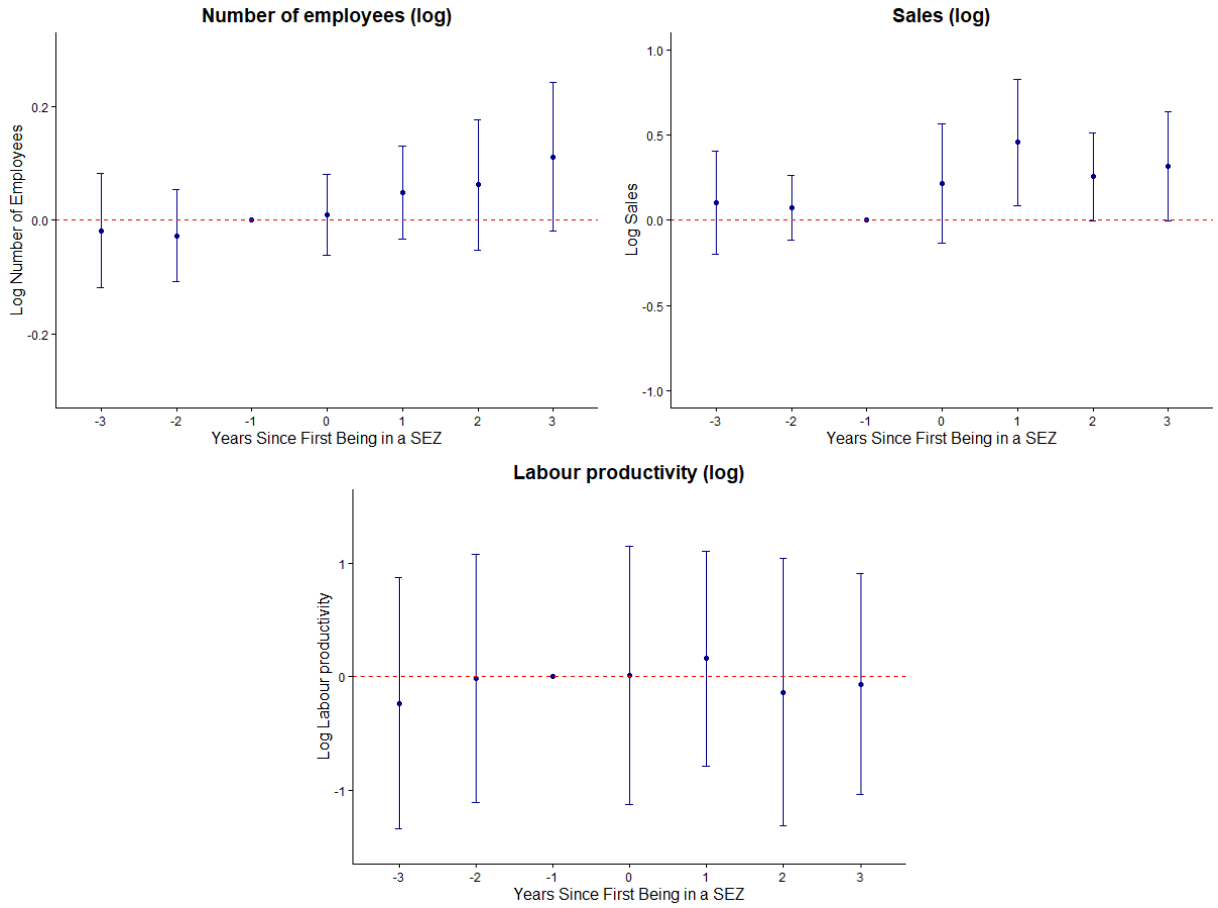


Figure 25: By types of firms - Only state domestic firms - Spillovers

Note: Figure 25 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only state domestic firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [39]. The vertical lines represent 95% confidence intervals.

5.4.4 By industry

Operating in an SEZ could also have different impacts on firms with different industries. Industry variations in the type of industries (manufacturing or service).

Only Manufacturing firms Figure 26 shows results for only manufacturing firms. We see a similar trend for number of employees and labour productivity. However, for sales, we see an increase of total sales by around 13% and 16.4% for firms after entering into SEZs.

Table 9: Heterogeneity Results: By industry

	Number of employees		Sales		Labour productivity	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
Panel A. Only Manufacturing firms						
SEZs	0.098	0.035	0.381***	0.076	0.179***	-0.067
	(0.065)	(0.056)	(0.112)	(0.086)	(0.078)	(0.065)
Obs	575,445	565,461	741,233	563,972	482,690	472,170
Panel B. Only Service firms						
SEZs	-0.130	0.030	0.234	0.072	0.046	-0.008
	(0.092)	(0.029)	(0.187)	(0.050)	(0.165)	(0.070)
Obs	2,310,345	2,477,552	2,307,019	2,474,197	1,965,794	2,105,800

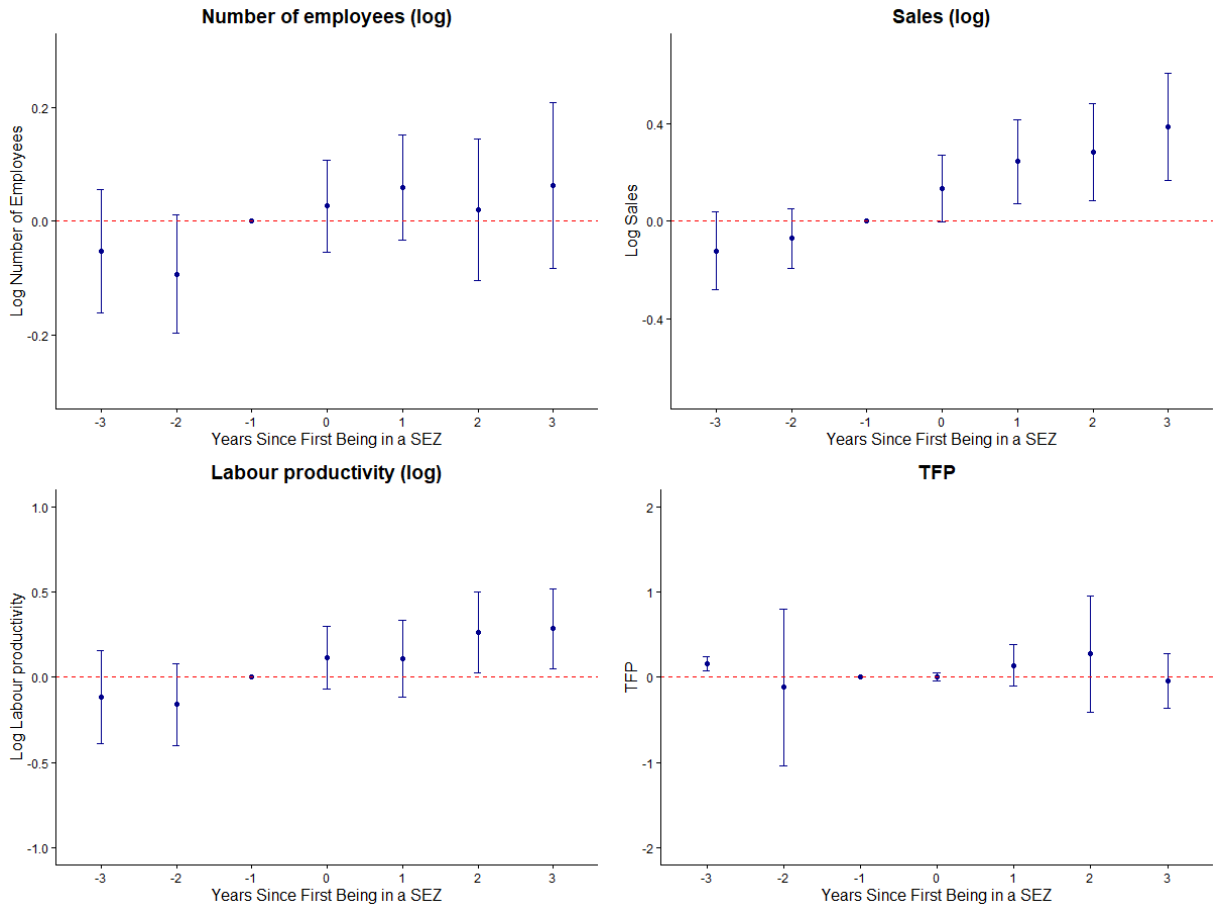


Figure 26: By types of industries - Only manufacturing industries - Direct Effects

Note: Figure 26 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only manufacturing firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [40]. The vertical lines represent 95% confidence intervals.

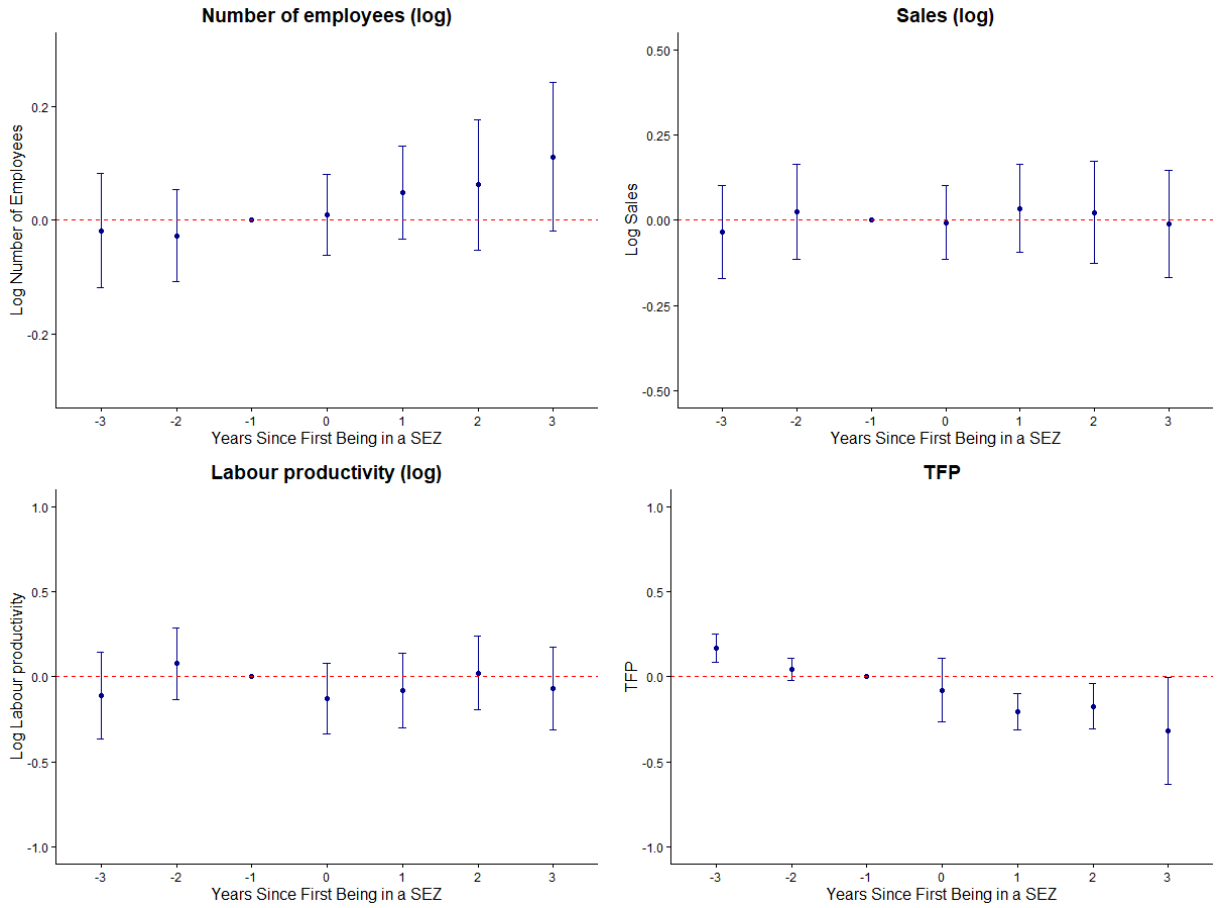


Figure 27: By types of industries - Only manufacturing industries - Spillovers

Note: Figure 27 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only manufacturing firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [41]. The vertical lines represent 95% confidence intervals.

Only Service firms Figure 28 shows results for only service firms. We see a similar trend for number of employees, labour productivity and sales after entering into SEZs.

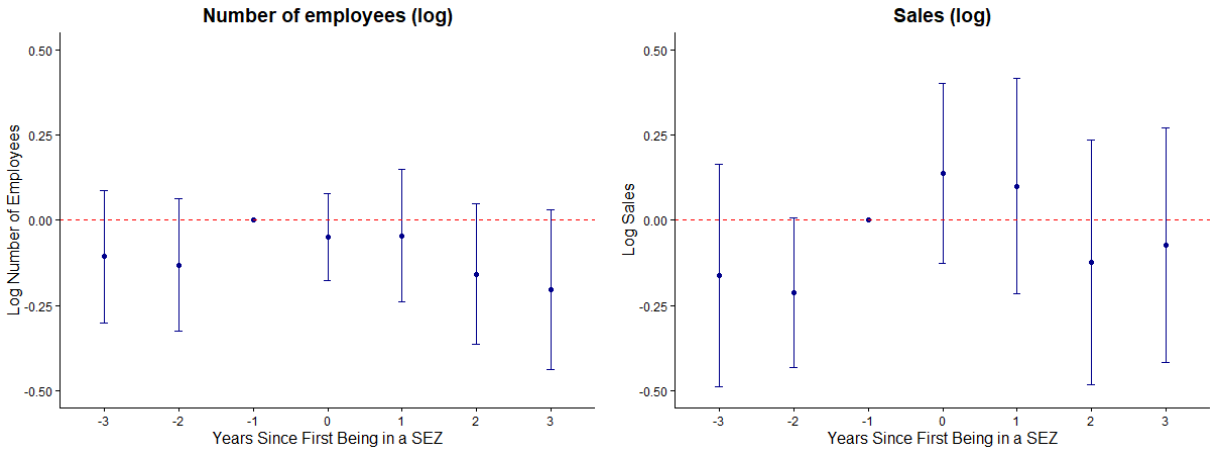


Figure 28: By types of industries - Only service industries - Direct Effects

Note: Figure 28 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only service firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [42]. The vertical lines represent 95% confidence intervals.

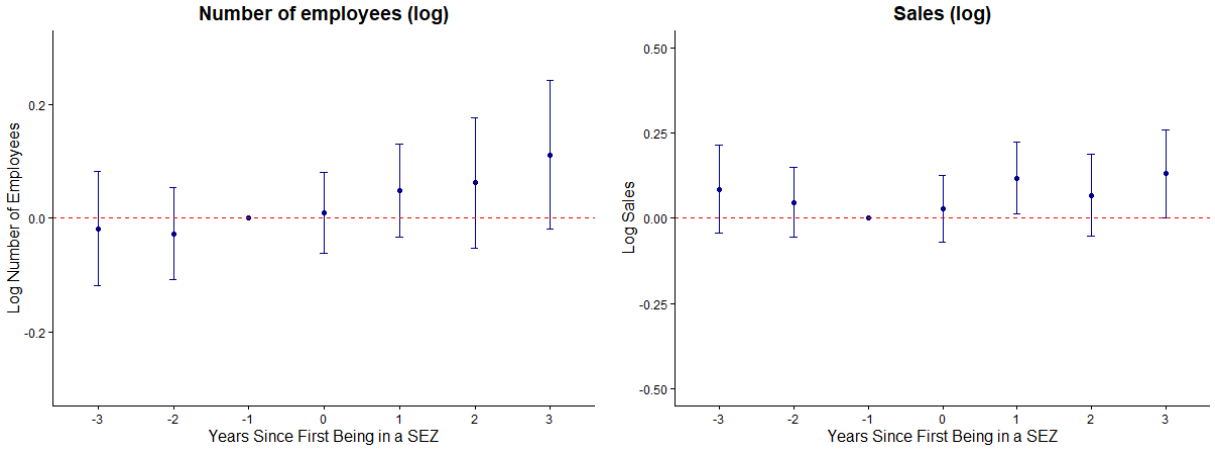


Figure 29: By types of industries - Only service industries - Spillovers

Note: Figure 29 plots the estimated β_k event study coefficients from a regression of the form given in equation 1 using Callaway and Sant'Anna (2021), where the dependent variable is, in turn, log number of employees, log sales, log labour productivity. The event is defined as when firms enter into a SEZ area or when a SEZ established in that area (if firms enter in the same year as the year SEZ established), limiting for only service firms. The control group is never treated firms (firms which are never in a SEZ). β_{-1}, the coefficient of the year prior to when firms enter into SEZs, is normalized to zero [43]. The vertical lines represent 95% confidence intervals.

5.5 Potential channels

The previous section demonstrates that SEZ establishment have limited spillover effects, and benefit more for larger firms, state domestic firms, firms in service industries and industrial parks work better than other types of parks (excluding high-tech zones). In this section, we investigate the validity of different hypotheses that explain these limited spillover effects:

(1) absorb capacity to explain different effects for firm sizes and industry heterogeneity, (2) rent-seeking channel to explain the puzzling results when state domestic firms increase sales but not in labor productivity, and (3) agglomeration and competition channel.

5.5.1 Absorptive capacity

Absorptive capacity refers to a firm's proficiency in identifying, assimilating, and utilizing new information for commercial purposes (Cohen and Levinthal, 1990). Cohen and Levinthal suggest that firms enhance their absorptive capacity by participating in activities that require related prior knowledge. Kokko (1994), using cross-sectional industry-level data from Mexico, tested the idea that FDI spillovers on domestic firms depend on the technological distance between foreign multinationals and domestic firms. The hypothesis that the degree of FDI spillover hinges on the absorptive capcaity of domestic firms has been further explored in the literature. For example, Blalock and Gertler (2009), using a panel dataset of Indonesian manufacturing firms for the 1988 to 1996 period, find that firms with more R&D investment benefit more from the presence of foreign multinationals. We present two pieces of evidence consistent with absorptive capacity hindering firms to benefit from SEZs.

First, we use the firm's research and development (R&D) investment in year 2007 as a measure of initial absorptive capacity of firms [44] We code the firm's R&D (measured in 2007) as 0 if firms do not invest anything in R&D, and 1 if the total cost greater than 0. We then run a triple difference-in-difference model where we have variable R&D investment interacting with *post* and *treat* variable. If absorptive capacity could be channel explaining the limited effects of SEZs, we expect that the coefficient for this triple difference-in-difference variable treat $\times$ post $\times$ R&D should be positive. The results are presented in table **??**.

Second, another way to measure a firm's absorptive capacity is by the number of skilled employees with adequate training and education to effectively implement technology. We quantify human capital by the percentage of a firm's workforce that holds a college degree or higher in year 2007 [45]. Similar to the above argument, we expect that the coefficient for for this triple difference-in-difference variable treat $\times$ post $\times$ R&D workers should be positive. The results are presented in table 10.

[44]The questionnaire in year 2007 has questions related to scientists and investment to research scientific and develop technology. We use the variable of total cost for scientific and technological research in the year.

[45]The questionnaire in year 2007 has questions related to officer working directly in science and technology up to the end of 2007. We use this variable to account for the number of workers in science and technology in year 2007.

Table 10: Potential channels: Absorptive capacity

	Number of employees		Sales		Labour productivity	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
Panel A. R&D investment						
SEZs	0.086***		0.019	-0.186	-0.228***	-0.270
	(0.009)	()	(0.087)	()	(0.057)	()
SEZ * R&D	-0.263		-0.184		0.064	
	(0.166)	()	(0.197)	()	(0.157)	()
Obs	3,554,340		3,548,382		3,071,728	

5.6 Other measures of firm performance

The above analyses focus on firm size and productivity as the measurement of firm performance. It is possible that firms could benefit from the establishment of SEZs in aspects other than sizes and production efficiency. In this section, we consider some of the other measures of firm performance that could be relevant for SEZ spillovers.

5.6.1 Probability of adopting automation technologies

We examine whether firms in SEZ communes and firms not in SEZ communes are different in their automation adoption. Since we only have data relevant for automation adoption in one year (2019), the result of this section is only descriptive.

Table 11: Other firms' performance: automation adoption, innovation and probability to import/export

	Automation Adoption		Credit		Imports		Exports	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
SEZs	0.149***	0.029*	0.040	0.051*	-0.058***	0.010	-0.014	-0.008
	(0.019)	(0.016)	(0.047)	(0.023)	(0.017)	(0.005)	(0.011)	(0.004)
Obs	6,967	7,073		2,875,794	2,972,220	3,184,642	2,972,220	3,184,642

Table 12: Other firms' performance: automation adoption, innovation and probability to import/export

	Tax rate		Capital Intensity		Capital Per Worker	
	Direct	Indirect	Direct	Indirect	Direct	Indirect
SEZs	0.003	0.002	-0.183***	-0.018	0.156***	0.068***
	(0.003)	(0.002)	(0.059)	(0.038)	(0.052)	(0.028)
Obs		3,089,594		3,136,643		3,136,103

5.6.2 Probability of getting loans

5.6.3 Probability of importing

5.6.4 Probability of exporting

6 Future Work

In a more updated version of this paper, we will present a more careful and detailed version of our preliminary results. First, we will include validity checks for our results including the sensitivity analysis following suggestions by Roth and Sant'Anna (2023). Second, we will do a placebo check for the case where SEZs were passed by the central government, but then could not attract any FDI and have to close. Third, we will add robustness check, including alternative definitions for SEZs, non-balanced sample, and remove some important communes that attract a majority of SEZs.

After checking that our results on firms' performance hold true and robust, we will move forward to test the reasons behind. Our first explanation might lie on the fact that there is no spillovers in terms of innovative capability for domestic firms. We will use ASEAN patstats database matched with firms by names and testing this mechanism if there is any spillovers in terms of innovative capacity, as measured by using patents, or we will test using investment in machinery. The second explanation might be on the fact there is some misallocation of SEZs when the government try to establish everywhere in the country. The third explanation could be that the types of activities conducted by SEZ firms are more labor-intensive and do labour-intensive tasks and not much change in the labor productivity. This is difficult to check as we cannot observe the level of education from hired workers. However, we could check in terms of the types of products that they produced (whether they become more complexed or only simple products). If they are only simple products, then it may suggest the newly workers hired mostly are low-skilled and doing labor-intensive tasks [46]. The last explanation might be on the fact that there is rent-seeking for firms operating in SEZs, for example firms might use their extra revenue/ profits to pay for local politicians to be able to operate in SEZs [47]

[46] Although we need to take into account that some firms only do assembling

[47] See Do et al. (2017) for a potential discussion on the impact of local officials' promotions' impact on infrastructure in their hometowns of patrelineal ancestry.

In conclusion, our preliminary results seems to suggest that the impacts of SEZs on firms in Vietnam bring both blessings and curses. While these firms in SEZs hire more workers compared to non-SEZs firms, their sales do not change much or even decrease slightly, and leads to labor productivity decreases compared to non-SEZs firms. It is a blessing as firms in SEZs could absorb workers, but it could be a curse if in long term, the labor productivity decreases compared to non-SEZ firms, and could be a hindrance for Vietnam on the road of moving to a more developed country.

References

Alfaro-Urena, A., I. Manelici, and J. P. Vasquez (2022): "The effects of joining multinational supply chains: New evidence from firm-to-firm linkages," *The Quarterly Journal of Economics*, 137, 1495–1552.

Alkon, M. (2018): "Do special economic zones induce developmental spillovers? Evidence from India's states," *World Development*, 107, 396–409.

Atalay, E., A. Hortaçsu, M. Runyun, C. Syverson, and M. F. Ulu (2023): "Micro- and Macroeconomic Impacts of a Place-Based Industrial Policy," Tech. rep., National Bureau of Economic Research.

Bai, J., P. J. Barwick, S. Cao, and S. Li (2020): "Quid pro quo, knowledge spillover, and industrial quality upgrading: Evidence from the Chinese auto industry," Tech. rep., National Bureau of Economic Research.

Bajgar, M. and B. Javorcik (2020): "Climbing the rungs of the quality ladder: FDI and domestic exporters in Romania," *The Economic Journal*, 130, 937–955.

Balsvik, R. (2011): "Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing," *The review of economics and statistics*, 93, 285–297.

Bilir, L. K. and E. Morales (2020): "Innovation in the global firm," *Journal of Political Economy*, 128, 1566–1625.

Blalock, G. and P. J. Gertler (2009): "How firm capabilities affect who benefits from foreign technology," *Journal of Development Economics*, 90, 192–199.

Borusyak, K., X. Jaravel, and J. Spiess (2021): "Revisiting event study designs: Robust and efficient estimation," *arXiv preprint arXiv:2108.12419*.

Brussevich, M. (2024): "The socioeconomic impact of Special Economic Zones: Evidence from Cambodia," *The World Economy*, 47, 362–387.

Callaway, B. and P. H. Sant'Anna (2021): "Difference-in-differences with multiple time periods," *Journal of econometrics*, 225, 200–230.

Chen, B., M. Lu, C. Timmins, and K. Xiang (2019): "Spatial misallocation: Evaluating place-based policies using a natural experiment in China," Tech. rep., National Bureau of Economic Research.

Cirera, X., D. Comin, M. Cruz, K. M. Lee, and A. Soares Martins-Neto (2021): "Firm-level technology adoption in Vietnam," .

De Chaisemartin, C. and X. d'Haultfoeuille (2020): "Two-way fixed effects estimators with heterogeneous treatment effects," *American economic review*, 110, 2964–2996.

Do, Q.-A., K.-T. Nguyen, and A. N. Tran (2017): "One mandarin benefits the whole clan: hometown favoritism in an authoritarian regime," *American Economic Journal: Applied Economics*, 9, 1–29.

Gallé, J., D. Overbeck, N. Riedel, and T. Seidel (2023): "Place-based policies, structural change and female labor: Evidence from India's Special Economic Zones," in *Place-based policies, structural change and female labor: Evidence from India's Special Economic Zones: Gallé, Johannes— uOverbeck, Daniel— uRiedel, Nadine— uSeidel, Tobias*, [Sl]: SSRN.

Goodman-Bacon, A., A. Nichols, and T. Goldring (2019): "Bacon decomposition for understanding differences-in-differences with variation in treatment timing," *NBER Working Paper*.

Görg, H. and A. Mulyukova (2022): "Place-based policies and agglomeration economies: Firm-level evidence from special economic zones in India," .

Harrison, A. and A. Rodríguez-Clare (2010): "Trade, foreign investment, and industrial policy for developing countries," *Handbook of development economics*, 5, 4039–4214.

Hasan, R., Y. Jiang, and R. M. Rafols (2021): "Place-based preferential tax policy and industrial development: Evidence from India's program on industrially backward districts," *Journal of Development Economics*, 150, 102621.

Keller, W. (2021): "Knowledge spillovers, trade, and FDI," Tech. rep., National Bureau of Economic Research.

Kokko, A. (1994): "Technology, market characteristics, and spillovers," *Journal of development economics*, 43, 279–293.

LaPoint, C. and S. Sakabe (2021): "Place-based policies and the geography of corporate investment," *Available at SSRN 3950548*.

Lerche, A. (2022): "Investment tax credits and the response of firms," .

Loecker, J. D. (2013): "Detecting learning by exporting," *American Economic Journal: Microeconomics*, 5, 1–21.

Lu, F., W. Sun, and J. Wu (2023): "Special Economic Zones and Human Capital Investment: 30 Years of Evidence from China," *American Economic Journal: Economic Policy*, 15, 35–64.

Lu, Y., Z. Tao, and L. Zhu (2017): "Identifying FDI spillovers," *Journal of International Economics*, 107, 75–90.

Lu, Y., J. Wang, and L. Zhu (2019): "Place-based policies, creation, and agglomeration economies: Evidence from China's economic zone program," *American Economic Journal: Economic Policy*, 11, 325–360.

McCaig, B., N. Pavcnik, and W. F. Wong (2022): "FDI inflows and domestic firms: Adjustments to new export opportunities," Tech. rep., National Bureau of Economic Research.

Neumark, D. and H. Simpson (2015): "Place-based policies," in *Handbook of regional and urban economics*, Elsevier, vol. 5, 1197–1287.

Nguyen, H. Q. and D. N. Tien (2021): "Special economic zones and FDI attraction to districts in Vietnam: a non-parametric approach," *The Singapore Economic Review*, 66, 1027–1053.

Ning, L., R. Guo, and K. Chen (2023): "Does FDI bring knowledge externalities for host country firms to develop complex technologies? The catalytic role of overseas returnee clustering structures," *Research Policy*, 52, 104767.

Roth, J. and P. H. Sant'Anna (2023): "Efficient estimation for staggered rollout designs," *Journal of Political Economy Microeconomics*, 1, 669–709.

Rothenberg, A. D., S. Bazzi, S. Nataraj, and A. V. Chari (2017): *When Regional Policies Fail: An Evaluation of Indonesia's Integrated Economic Development Zones*, Santa Monica, CA: RAND Corporation.

Seiler, V., B. M. Gilroy, C. Peitz, and N. Stöckmann (2023): "40 years of economic reform-the case of Pudong new area open economic zone in Shanghai," *Applied Economics*, 55, 1845–1858.

Stoyanov, A. and N. Zubanov (2012): "Productivity spillovers across firms through worker mobility," *American Economic Journal: Applied Economics*, 4, 168–198.

Sun, L. and S. Abraham (2021): "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," *Journal of econometrics*, 225, 175–199.

Taglioni, D. and D. Winkler (2016): *Making global value chains work for development*, World Bank Publications.

UNCTAD (2018): "World Investment Report 2019: Special Economic Zones: United Nations Conference on Trade and Development, Geneva and New York, 2019," .

Wang, J. (2013): "The economic impact of special economic zones: Evidence from Chinese municipalities," *Journal of development economics*, 101, 133–147.

Table 13: Sample

	Within areas (direct effects)		Within commune (spillover effects)	
	Nb of firms	Nb of obs	Nb of firms	Nb of obs
By types of SEZ				
- Industrial SEZ	828,286	3,946,659	879,555	4,003,679
- Border SEZ	819,586	3,882,190	826,741	3,737,035
- Economic zones	820,472	3,886,705	827,686	3,738,067
- Special SEZ	818,929	3,878,903	826,409	3,738,577
- Provincial SEZ	822,517	3,903,760	888,029	4,060,564
By sizes of firms				
- Very small	720,165	2,851,931	717,459	2,833,612
- Small	213,178	1,407,466	208,648	1,357,890
- Medium	11,281	96,614	10,307	83,647
- Big	10,667	97,501	9,056	76,395
By types of firms				
- Foreign	23,244	127,097	19,595	87,174
- Private domestic	910,674	4,177,399	904,204	4,117,951
- State	28,888	149,016	28,596	146,419
By industry				
- Manufacturing	209,870	853,546	203,288	783,695
- Service	759,082	3,277,053	754,765	3,248,644
By industry type				
- Labor-intensive	381,952	1,351,173	378,260	1,322,695
- Capital-intensive	131,675	528,249	126,678	477,412

Table 14: Sample

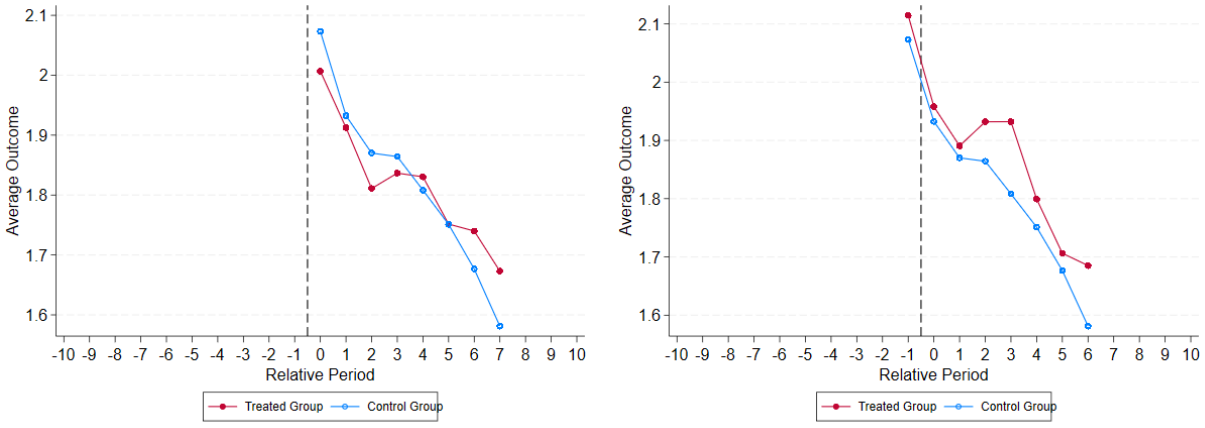
	Within areas (direct effects)				Within commune (spillover effects)			
	Nb of SEZ firms	Nb of SEZ obs	Nb of non-SEZ firms	Nb of non-SEZ obs	Nb of SEZ firms	Nb of SEZ obs	Nb of non-SEZ firms	Nb of non-SEZ obs
By types of SEZ								
- Industrial SEZ	9,804	71,458	818,482	3,875,201	74,721	286,914	822,368	3,716,765
- Special SEZ	447	3,702	818,482	3,875,201	6,175	21,812	822,368	3,716,765
- Economic zones	1,990	11,504	818,482	3,875,201	6,304	21,302	822,368	3,716,765
- Border SEZ	1,104	6,989	818,482	3,875,201	5,022	20,270	822,368	3,716,765
- Provincial SEZ	4,035	28,559	818,482	3,875,201	87,798	343,799	822,368	3,716,765
By sizes of firms								
- Very small	3,460	19,889	621,126	2,512,941	119,651	409,266	621,799	2,424,346
- Small	6,548	55,370	181,738	1,221,867	38,902	200,347	183,609	1,157,543
- Medium	1,550	14,791	8,469	73,747	2,126	12,963	9,025	70,684
- Big	2,427	23,662	7,149	66,646	1,944	12,203	7,935	64,192
By types of firms								
- Foreign	5,315	44,633	14,393	71,645	4,756	15,947	15,912	71,227
- Private domestic	8,865	66,034	784,664	3,671,265	154,873	600,048	786,698	3,517,903
- State	450	3,045	25,656	132,291	3,894	18,784	25,735	127,635
By industry								
- Manufacturing	9,708	78,478	168,386	668,217	42,619	149,860	169,254	633,835
- Service	5,539	31,345	662,773	2,923,549	120,814	438,796	661,660	2,809,848
By industry type								
- Labor-intensive	4,941	31,364	333,889	1,189,992	57,497	177,606	331,514	1,145,089
- Capital-intensive	7,296	57,342	103,299	401,490	28,188	97,097	103,794	380,315

7 Appendix

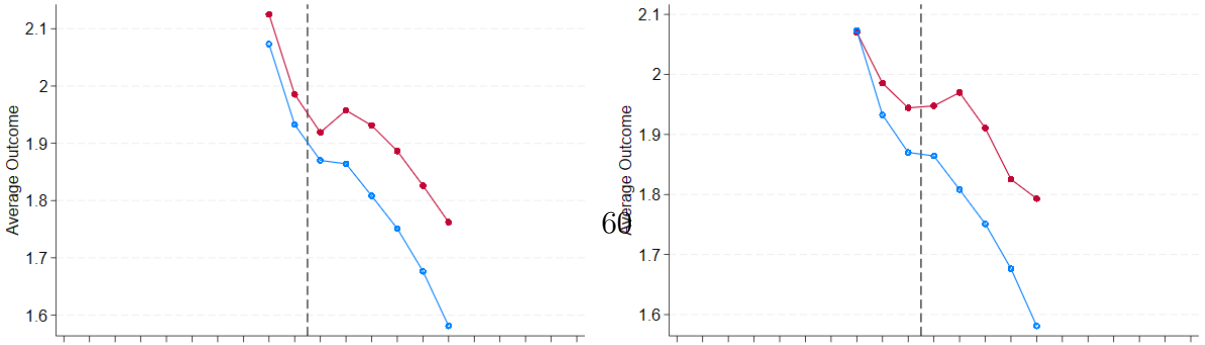
Appendix A1. Sample

Appendix A2. Raw data compared treated and control groups over employment

(A) Left: Employment Year 2012; Right: Employment Year 2013

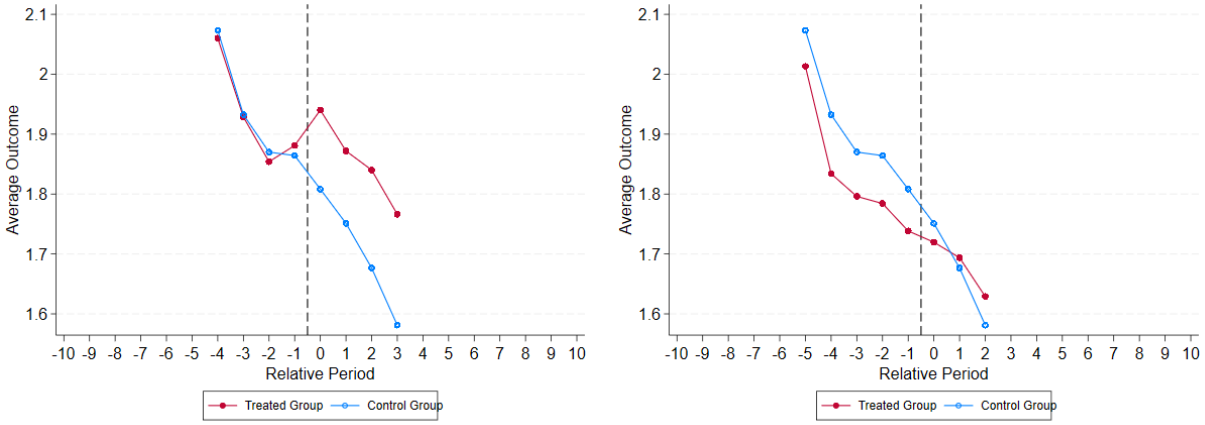


(B) Left: Employment Year 2014; Right: Employment Year 2015



Appendix A2. Raw data compared treated and control groups over employment

(C) Left: Employment Year 2016; Right: Employment Year 2017



(C) Left: Employment Year 2018; Right: Employment Year 2019

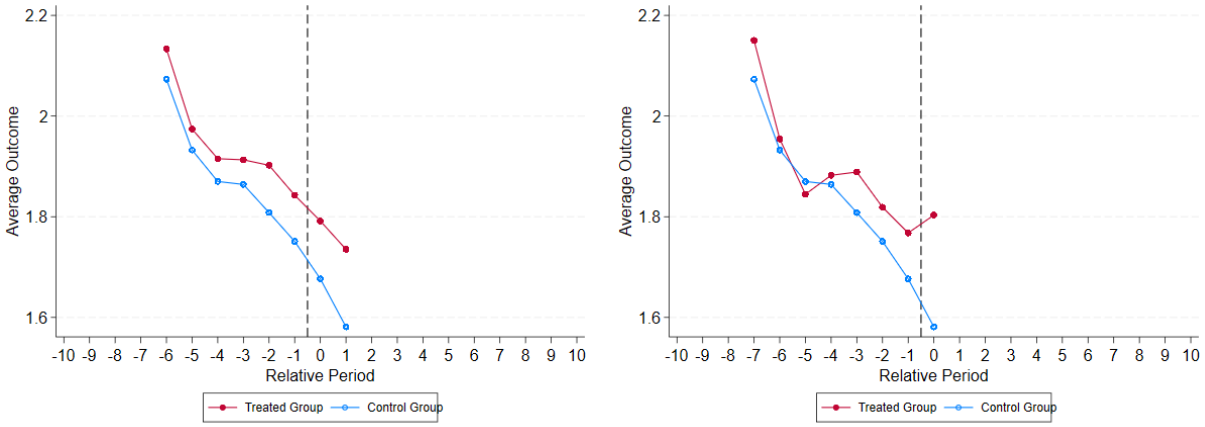
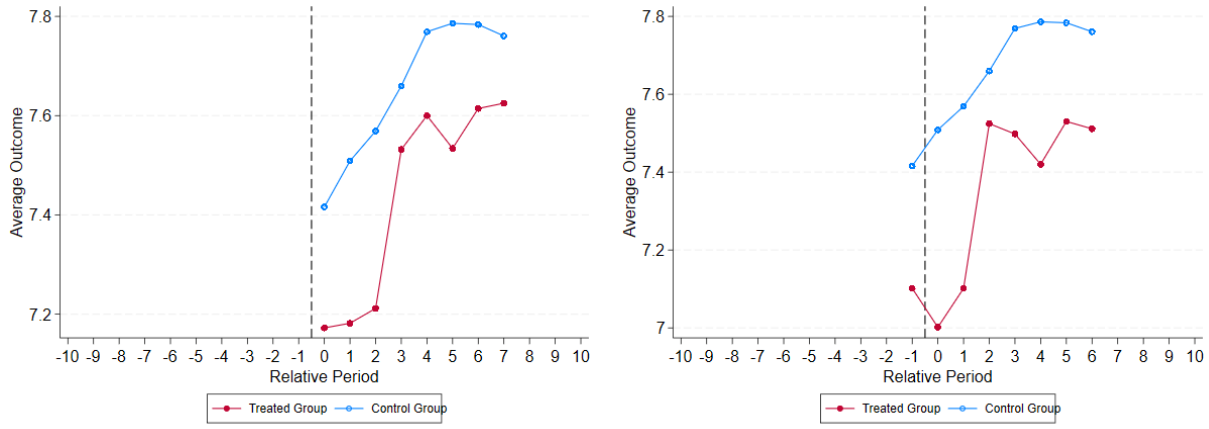


Figure 31: Raw data compared treated and control groups over employment

Appendix A3. Raw data compared treated and control groups over revenue

(A) Left: Revenue Year 2012; Right: Revenue Year 2013



(B) Left: Revenue Year 2014; Right: Revenue Year 2015

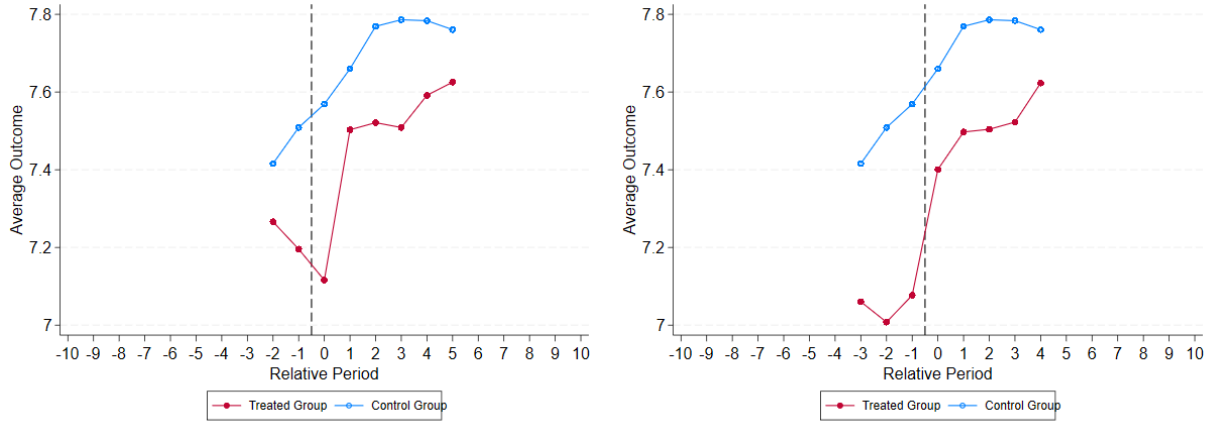
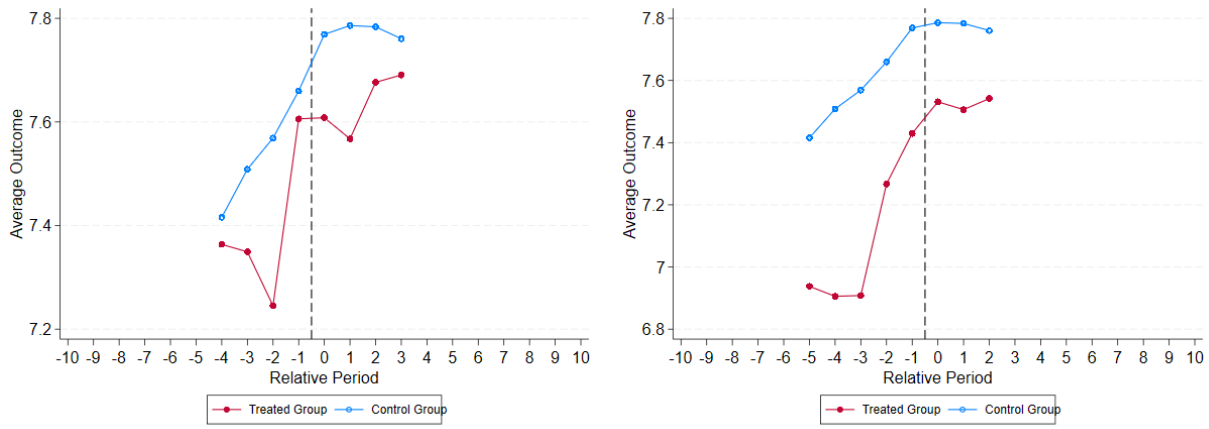


Figure 32: Raw data compared treated and control groups over revenue

Appendix A3. Raw data compared treated and control groups over revenue

(C) Left: Revenue Year 2016; Right: Revenue Year 2017



(C) Left: Revenue Year 2018; Right: Revenue Year 2019

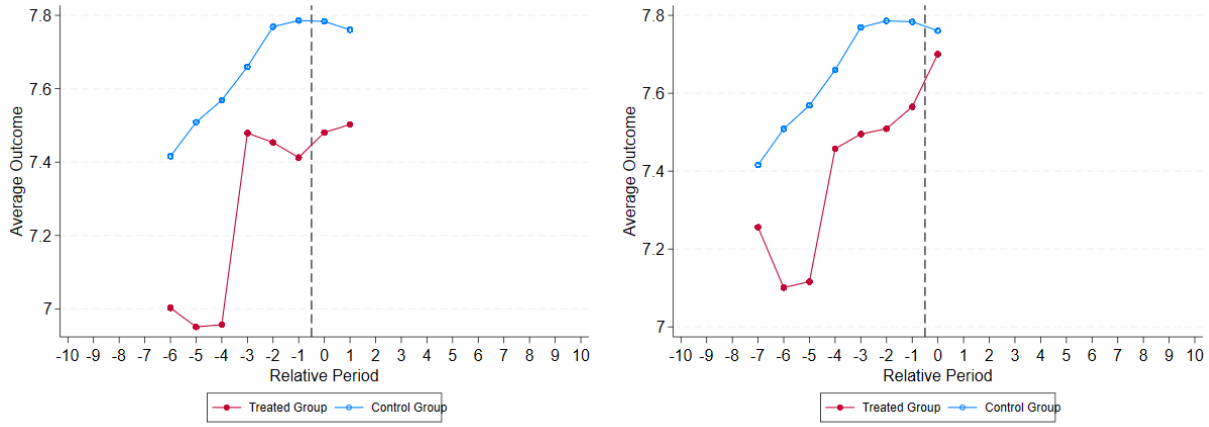


Figure 33: Raw data compared treated and control groups over revenue

Online Appendix B

Our Vietnamese enterprise survey dataset contains information surveyed by Statistics Office of Vietnam of formal active firms over the 2007 to 2019 period. The firms surveyed in the dataset include all formal active firms with more than 10 employees, however, some firms with fewer employees also appear in the dataset The survey contains a wide range of information from firms' details (number of employees, industry, types of firms), to balance sheet data (total sales, total net assets, total cost, profits). We use total fixed assets as a proxy for total net assets of firms, and total costs include. In the dataset, several firms with the same tax ID. For plants with the same tax ID, we aggregate their information and use

address of the headquarter as the address of the firms. For several firs with the same tax ID information and information related to number of employees, number of female employees as well as address information, we mark these firms as duplicates, and only keep one firm while dropping the other firms.

We drop firms with missing data employment, revenue, industry, types of firms, assets, and missing information on province/city and commune address information. We also change to missing for some observations with outliers in labour productivity and TFP.

Online Appendix C

Robustness of Baseline Estimates

Table 15: Summary Statistics - No Matching

	Nb of obs	SEZ area firms (1)	Nb of obs	Never treated firms (2)	Difference (2) - (1) (3)
Agriculture, Forestry	113,712	0.0002	3,875,201	0.001	0.001***
and Fishing		(0.000)		(0.000)	(0.000)
Mining and quarrying	113,712	0.108	3,875,201	0.029	-0.080***
		(0.001)		(0.000)	(0.000)
Manufacturing food	113,712	0.063	3,875,201	0.018	-0.045***
and tobacco		(0.001)		(0.000)	(0.000)
Manufacturing textiles	113,712	0.071	3,875,201	0.034	-0.037***
		(0.001)		(0.000)	(0.001)
Manufacturing woods	113,712	0.053	3,875,201	0.007	-0.045***
		(0.001)		(0.000)	(0.000)
Manufacturing coke,	113,712	0.218	3,875,201	0.045	-0.173***
rubber, chemicals		(0.002)		(0.000)	(0.001)
Manufacturing metals	113,712	0.061	3,875,201	0.004	-0.057***
		(0.001)		(0.000)	(0.000)
Manufacturing machinery	113,712	0.109	3,875,201	0.029	-0.081***
		(0.001)		(0.000)	(0.001)
Construction	113,712	0.011	3,875,201	0.025	0.014***
		(0.000)		(0.000)	(0.001)
Wholesale and Retail Trade	113,712	0.014	3,875,201	0.020	0.006***
		(0.000)		(0.000)	(0.001)
Transportation and Storage	113,712	0.004	3,875,201	0.018	0.014***
		(0.000)		(0.000)	(0.000)
Accommodation and	113,712	0.009	3,875,201	0.019	0.010***
Food Services		(0.000)		(0.000)	(0.001)
Information and	113,712	0.002	3,875,201	0.006	0.004***
Communication		(0.000)		(0.000)	(0.000)
Professional, Scientific	113,712	0.002	3,875,201	0.019	0.018***
and Technical		(0.000)		(0.000)	(0.001)
Other Services	113,712	0.027	3,875,201	0.105	0.077***
		(0.001)		(0.000)	(0.001)
Foreign	113,712	0.393	3,875,201	0.018	-0.374***
		(0.002)		(0.000)	(0.001)
Private Domestic	113,712	0.581	3,875,201	0.947	0.367***
		(0.002)		(0.000)	(0.001)
State Domestic	113,712	0.027	3,875,201	0.034	0.007***
		(0.001)		(0.000)	(0.001)
Sales	113,712	276,955.3	3,875,201	31,539.7	-245,415.6***
		(0.009)		(0.001)	(0.008)
Number of Workers	113,712	247.034	3,875,201	26.70	-220.34***
		(0.006)		(0.001)	(0.004)
Share of social	67,345	0.676	1,865,843	0.417	-0.260***
security workers		(0.001)		(0.000)	(0.001)

Notes: Column 1 shows means (standard deviations) for our main treated sample for direct effects - firms in SEZ areas. Column 2 shows means (standard deviation) for our main treated sample for spillover effects - firms outside SEZ areas and inside SEZ communes. Never treated group means firms located in communes that never have SEZ establishment. Column 4 shows estimated differences in means (p-values) between the treatment group and control group from column 1 and column 3, and column 5 shows estimated differences in means between the treatment group and control group from column 2 and column 3. The means are unweighted. All descriptive statistics pertain to one year prior to the event.
Source: Data are drawn from Vietnam Enterprise survey 2007-2019. See Section IIA for further information on sample construction.

Table 16: Summary Statistics - With Matching

	Nb of obs	SEZ area firms (1)	Nb of obs	Matching Never treated firms (2)	Difference (2) - (1) (3)
Agriculture, Forestry	6,882	0	19,034	0.002	0.002
and Fishing		(0)		(0.000)	(0.000)
Mining and quarrying	6,882	0.146	19,034	0.107	-0.040***
		(0.001)		(0.006)	(0.005)
Manufacturing food	6,882	0.071	19,034	0.046	-0.025***
and tobacco		(0.001)		(0.002)	(0.004)
Manufacturing textiles	6,882	0.095	19,034	0.070	-0.026***
		(0.001)		(0.004)	(0.003)
Manufacturing woods	6,882	0.040	19,034	0.037	-0.002
		(0.001)		(0.000)	(0.003)
Manufacturing coke,	6,882	0.241	19,034	0.167	-0.074***
rubber, chemicals		(0.002)		(0.000)	(0.006)
Manufacturing metals	6,882	0.044	19,034	0.034	-0.009***
		(0.001)		(0.000)	(0.003)
Manufacturing machinery	6,882	0.125	19,034	0.080	-0.044***
		(0.001)		(0.000)	(0.005)
Construction	6,882	0.016	19,034	0.022	0.006***
		(0.000)		(0.000)	(0.002)
Wholesale and Retail Trade	6,882	0.001	19,034	0.006	0.005***
		(0.000)		(0.000)	(0.001)
Transportation and Storage	6,882	0.005	19,034	0.008	0.002**
		(0.000)		(0.000)	(0.001)
Accommodation and	6,882	0	19,034	0.003	0.003***
Food Services		(0.000)		(0.000)	(0.000)
Information and	6,882	0.001	19,034	0.002	0.001
Communication		(0.000)		(0.000)	(0.001)
Professional, Scientific	6,882	0.005	19,034	0.005	0.000
and Technical		(0.000)		(0.000)	(0.001)
Other Services	6,882	0.015	19,034	0.050	0.034***
		(0.001)		(0.000)	(0.002)
Foreign	6,882	0.241	19,034	0.163	-0.078***
		(0.002)		(0.000)	(0.006)
Private Domestic	6,882	0.731	19,034	0.779	0.029***
		(0.002)		(0.000)	(0.001)
State Domestic	6,882	0.029	19,034	0.058	0.029***
		(0.001)		(0.000)	(0.003)
Sales	6,882	165028.7	19,034	113864.4	-51164.3***
		(0.009)		(0.001)	(6462.327)
Number of Workers	6,882	256.087	19,034	170.907	-85.179***
		(0.006)		(0.001)	(16.704)
Share of social	4,519	0.576	11,366	0.554	-0.022***
security workers		(0.001)		(0.000)	(0.005)

Notes: Column 1 shows means (standard deviations) for our main treated sample for direct effects - firms in SEZ areas. Column 2 shows means (standard deviation) for our main treated sample for spillover effects - firms outside SEZ areas and inside SEZ communes. Never treated group means firms located in communes that never have SEZ establishment. Column 4 shows estimated differences in means (p-values) between the treatment group and control group from column 1 and column 3, and column 5 shows estimated differences in means between the treatment group and control group from column 2 and column 3. The means are unweighted. All descriptive statistics pertain to one year prior to the event.
Source: Data are drawn from Vietnam Enterprise survey 2007-2019. See Section IIA for further information on sample construction.

Table 17: Summary Statistics - No Matching

	Nb of obs	SEZ commune firms (1)	Nb of obs	Never treated firms (2)	Difference (1) - (2) (3)
Agriculture, Forestry	634,779	0.0007	3,716,765	0.001	0.001***
and Fishing		(0.000)		(0.000)	(0.000)
Mining and quarrying	634,779	0.034	3,716,765	0.028	-0.006***
		(0.001)		(0.000)	(0.000)
Manufacturing food	634,779	0.022	3,716,765	0.018	-0.004***
and tobacco		(0.000)		(0.000)	(0.000)
Manufacturing textiles	634,779	0.042	3,716,765	0.033	-0.009***
		(0.001)		(0.000)	(0.000)
Manufacturing woods	634,779	0.010	3,716,765	0.007	-0.002***
		(0.000)		(0.000)	(0.000)
Manufacturing coke,	634,779	0.076	3,716,765	0.044	-0.031***
rubber, chemicals		(0.000)		(0.000)	(0.000)
Manufacturing metals	634,779	0.007	3,716,765	0.004	-0.002***
		(0.000)		(0.000)	(0.000)
Manufacturing machinery	634,779	0.039	3,716,765	0.029	-0.010***
		(0.000)		(0.000)	(0.000)
Construction	634,779	0.027	3,716,765	0.025	-0.002***
		(0.000)		(0.000)	(0.001)
Wholesale and Retail Trade	634,779	0.015	3,716,765	0.020	0.005***
		(0.000)		(0.000)	(0.001)
Transportation and Storage	634,779	0.013	3,716,765	0.018	0.005***
		(0.000)		(0.000)	(0.000)
Accommodation and	634,779	0.016	3,716,765	0.019	0.003***
Food Services		(0.000)		(0.000)	(0.000)
Information and	634,779	0.007	3,716,765	0.006	-0.0003***
Communication		(0.000)		(0.000)	(0.000)
Professional, Scientific	634,779	0.012	3,716,765	0.020	0.008***
and Technical		(0.000)		(0.000)	(0.000)
Other Services	634,779	0.094	3,716,765	0.105	0.012***
		(0.000)		(0.000)	(0.000)
Foreign	634,779	0.025	3,716,765	0.019	-0.006***
		(0.002)		(0.000)	(0.001)
Private Domestic	634,779	0.945	3,716,765	0.946	0.001***
		(0.000)		(0.000)	(0.000)
State Domestic	634,779	0.030	3,716,765	0.034	0.005***
		(0.000)		(0.000)	(0.000)
Sales	634,779	25957.07	3,716,765	32044.68	6087.60***
		(0.003)		(0.001)	(0.003)
Number of Workers	634,779	27.56	3,716,499	26.74	-0.823**
		(0.002)		(0.001)	(0.002)
Share of social	290,996	0.405	1,777,136	0.417	0.012***
security workers		(0.001)		(0.000)	(0.001)

Notes: Column 1 shows means (standard deviations) for our main treated sample for direct effects - firms in SEZ areas. Column 2 shows means (standard deviation) for our main treated sample for spillover effects - firms outside SEZ areas and inside SEZ communes. Never treated group means firms located in communes that never have SEZ establishment. Column 4 shows estimated differences in means (p-values) between the treatment group and control group from column 1 and column 3, and column 5 shows estimated differences in means between the treatment group and control group from column 2 and column 3. The means are unweighted. All descriptive statistics pertain to one year prior to the event.
Source: Data are drawn from Vietnam Enterprise survey 2007-2019. See Section IIA for further information on sample construction.

Table 18: Summary Statistics - With Matching

	Nb of obs	SEZ commune firms (1)	Nb of obs	Matching Never treated firms (2)	Difference (1) - (2) (3)
Agriculture, Forestry	69,075	0.001	219,827	0.001	0.000
and Fishing		(0.000)		(0.000)	(0.000)
Mining and quarrying	69,075	0.062	219,827	0.055	0.007***
		(0.001)		(0.000)	(0.000)
Manufacturing food	69,075	0.024	219,827	0.020	0.004***
and tobacco		(0.000)		(0.000)	(0.000)
Manufacturing textiles	69,075	0.060	219,827	0.055	0.005***
		(0.001)		(0.000)	(0.000)
Manufacturing woods	69,075	0.010	219,827	0.010	-0.000
		(0.000)		(0.000)	(0.000)
Manufacturing coke,	69,075	0.086	219,827	0.081	-.005***
rubber, chemicals		(0.000)		(0.000)	(0.000)
Manufacturing metals	69,075	0.004	219,827	0.004	-0.001***
		(0.000)		(0.000)	(0.000)
Manufacturing machinery	69,075	0.047	219,827	0.046	0.000
		(0.000)		(0.000)	(0.000)
Construction	69,075	0.031	219,827	0.028	0.003***
		(0.000)		(0.000)	(0.001)
Wholesale and Retail Trade	69,075	0.007	219,827	0.009	-0.002***
		(0.000)		(0.000)	(0.001)
Transportation and Storage	69,075	0.013	219,827	0.014	-0.000
		(0.000)		(0.000)	(0.000)
Accommodation and	69,075	0.007	219,827	0.009	-0.002***
Food Services		(0.000)		(0.000)	(0.000)
Information and	69,075	0.004	219,827	0.004	-0.000
Communication		(0.000)		(0.000)	(0.000)
Professional, Scientific	69,075	0.004	219,827	0.007	-0.004***
and Technical		(0.000)		(0.000)	(0.000)
Other Services	69,075	0.081	219,827	0.080	0.001
		(0.000)		(0.000)	(0.000)
Foreign	69,075	0.015	219,827	0.015	-0.000
		(0.002)		(0.000)	(0.001)
Private Domestic	69,075	0.919	219,827	0.921	0.002**
		(0.000)		(0.000)	(0.000)
State Domestic	69,075	0.066	219,827	0.063	0.003***
		(0.000)		(0.000)	(0.000)
Sales	69,075	32,365.61	219,827	32,944.72	579.12
		(0.003)		(0.001)	(0.003)
Number of Workers	69,075	46.145	219,827	42.25	3.892***
		(0.002)		(0.001)	(0.002)
Share of social	69,075	0.390	117,287	0.426	-0.035***
security workers		(0.001)		(0.000)	(0.001)

Notes: Column 1 shows means (standard deviations) for our main treated sample for direct effects - firms in SEZ areas. Column 2 shows means (standard deviation) for our main treated sample for spillover effects - firms outside SEZ areas and inside SEZ communes. Never treated group means firms located in communes that never have SEZ establishment. Column 4 shows estimated differences in means (p-values) between the treatment group and control group from column 1 and column 3, and column 5 shows estimated differences in means between the treatment group and control group from column 2 and column 3. The means are unweighted. All descriptive statistics pertain to one year prior to the event.
Source: Data are drawn from Vietnam Enterprise survey 2007-2019. See Section IIA for further information on sample construction.

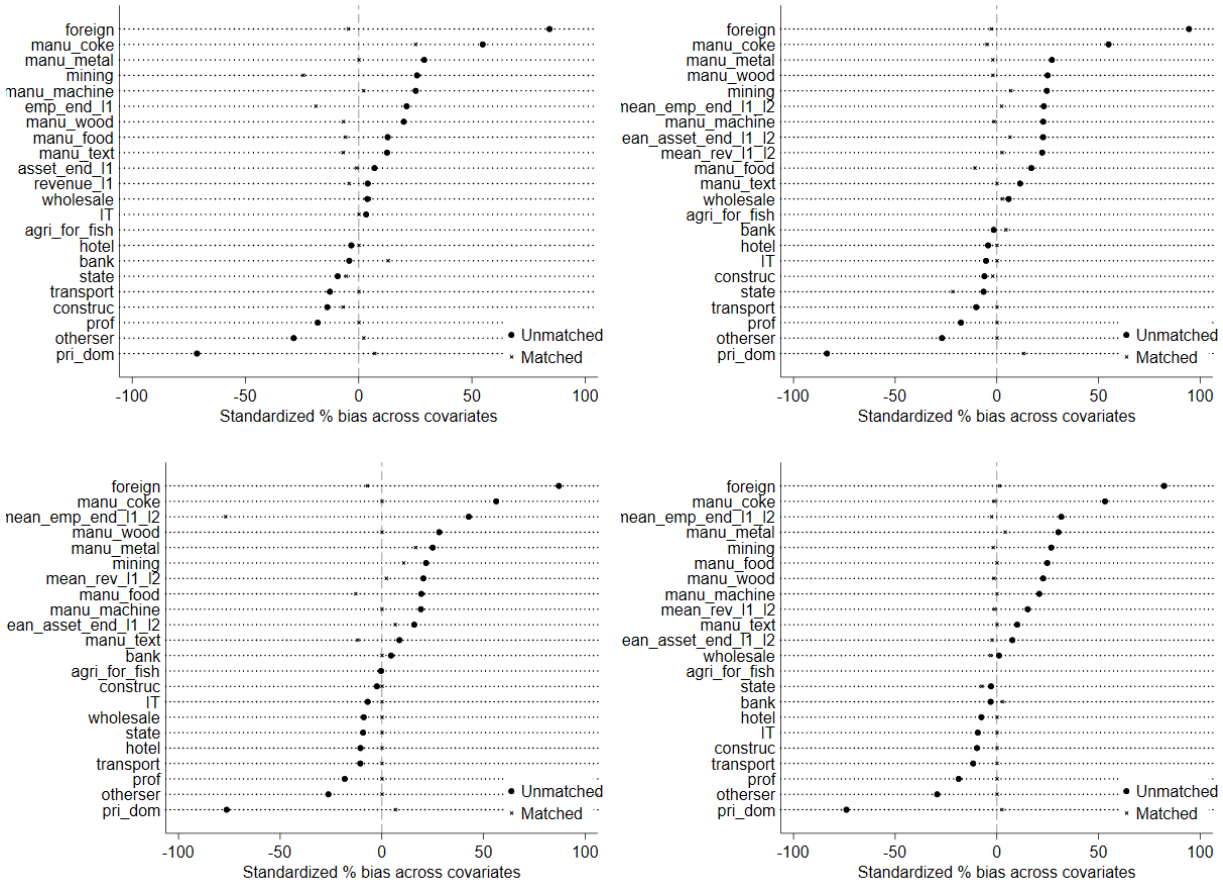


Figure 34: Balanced test between treated and control firms after before and after matching - within SEZ areas

Note: Figure 39 plots the balanced test between treated and control firms before and after matching within SEZ areas. The top left, top right, bottom left, bottom right are for year 2008, 2009, 2010, 2011, respectively.

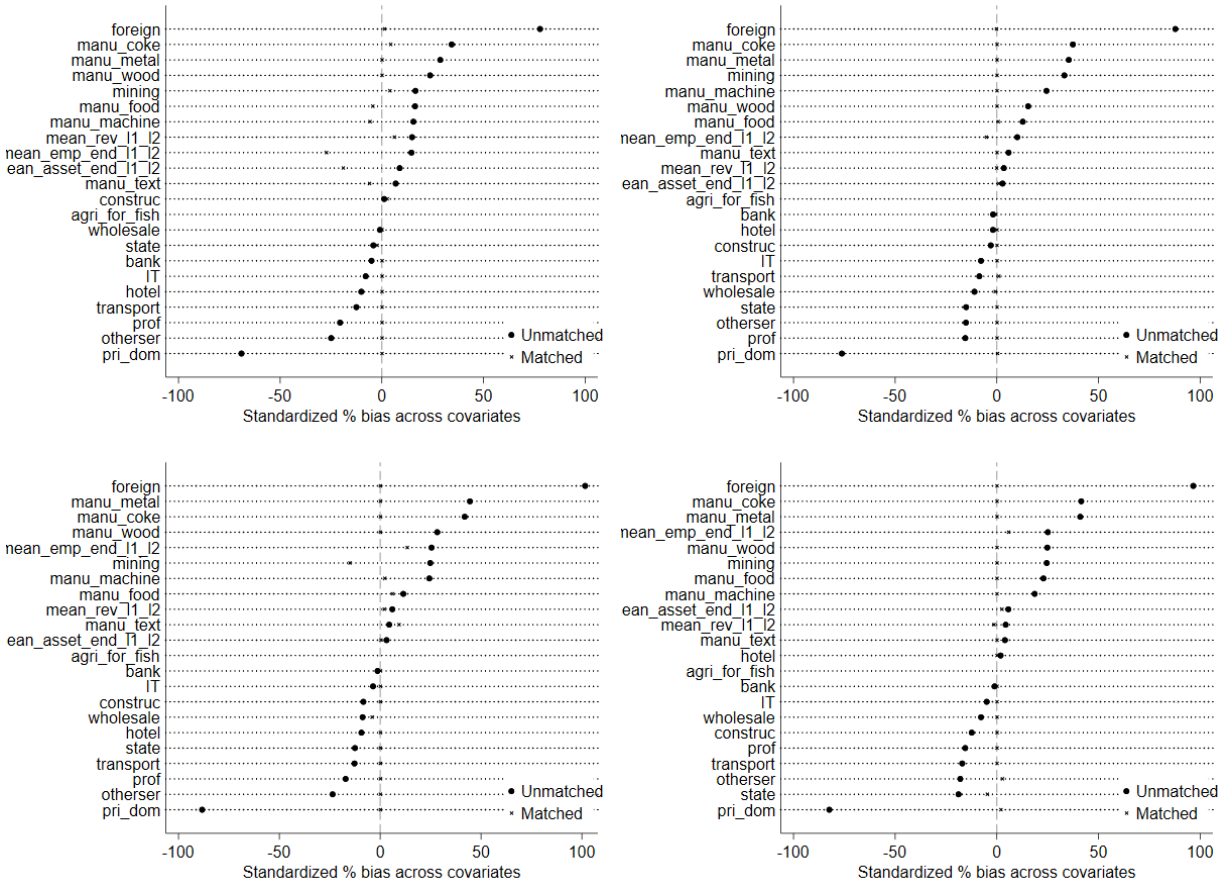


Figure 35: Balanced test between treated and control firms after before and after matching - within SEZ areas

Note: Figure 39 plots the balanced test between treated and control firms before and after matching within SEZ areas. The top left, top right, bottom left, bottom right are for year 2012, 2013, 2014, 2015, respectively.

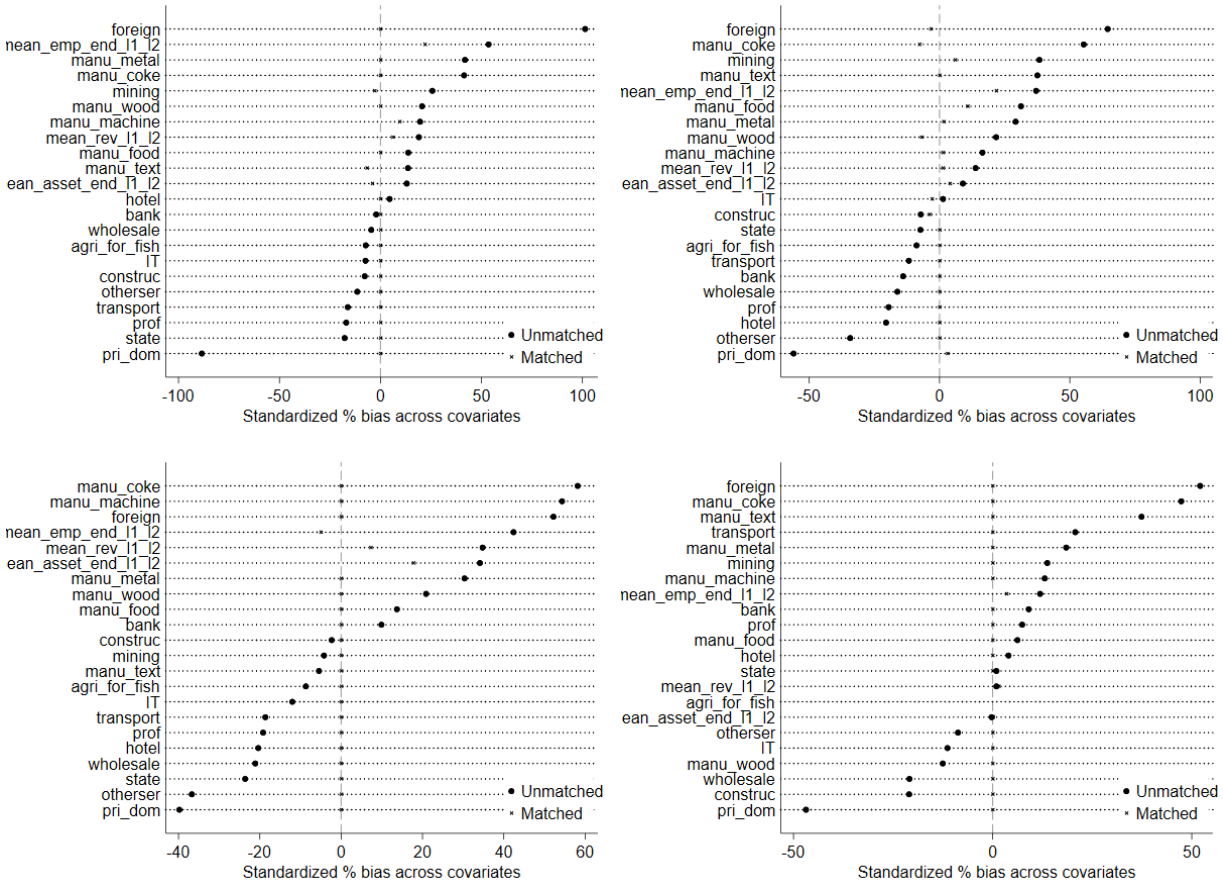


Figure 36: Balanced test between treated and control firms after before and after matching - within SEZ areas

Note: Figure 39 plots the balanced test between treated and control firms before and after matching within SEZ areas. The top left, top right, bottom left, bottom right are for year 2016, 2017, 2018, 2019, respectively.

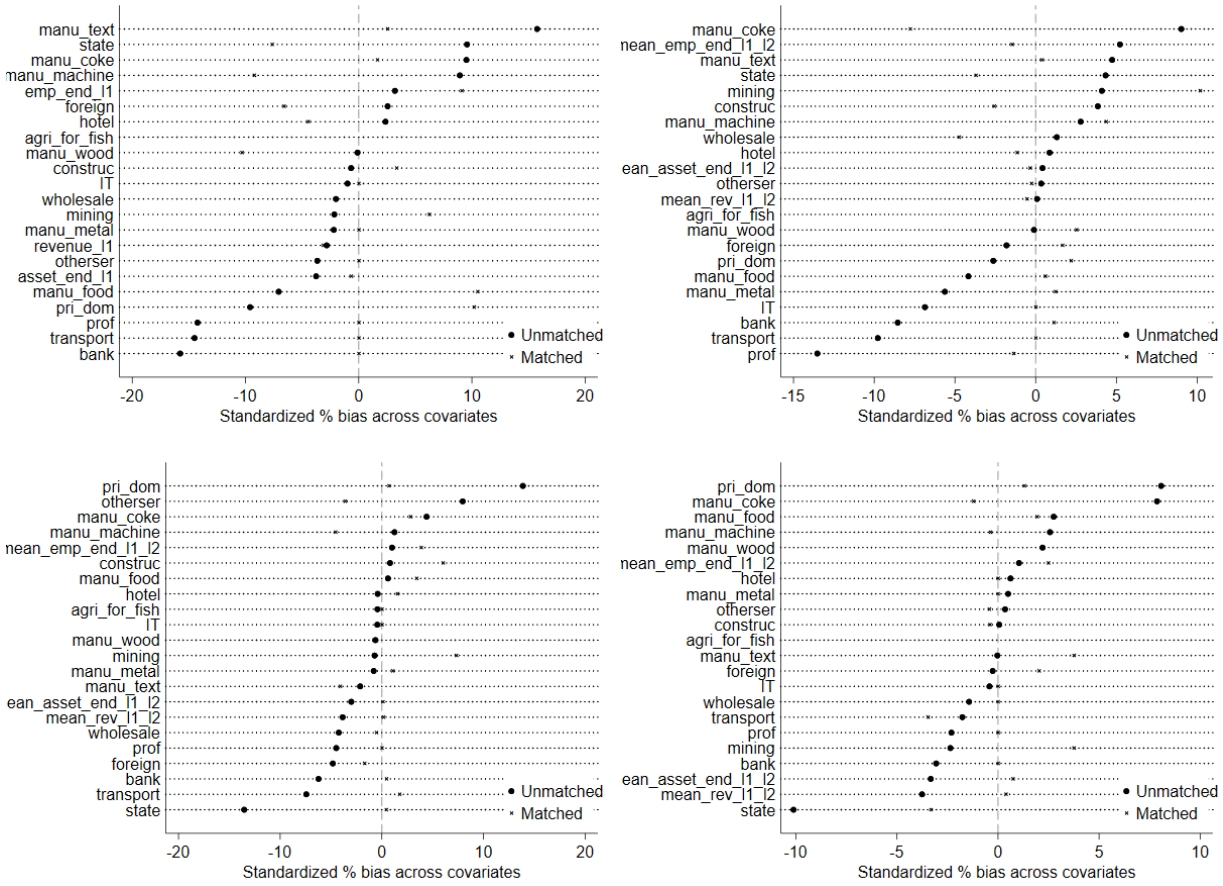


Figure 37: Balanced test between treated and control firms after before and after matching - within SEZ communes

Note: Figure 37 plots the balanced test between treated and control firms before and after matching within SEZ communes. The top left, top right, bottom left, bottom right are for year 2008, 2009, 2010, 2011, respectively.

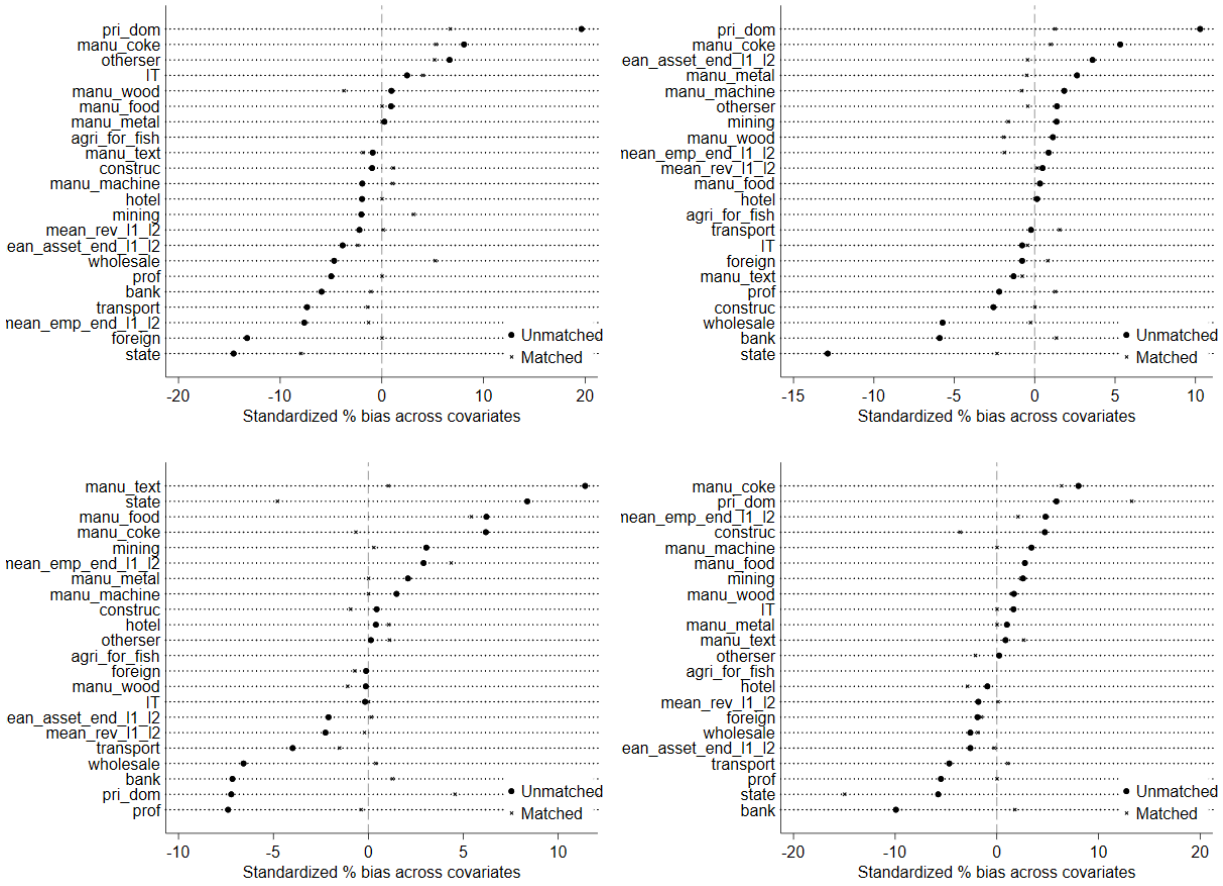


Figure 38: Balanced test between treated and control firms after before and after matching - within SEZ communes

Note: Figure 39 plots the balanced test between treated and control firms before and after matching within SEZ communes. The top left, top right, bottom left, bottom right are for year 2012, 2013, 2014, 2015, respectively.

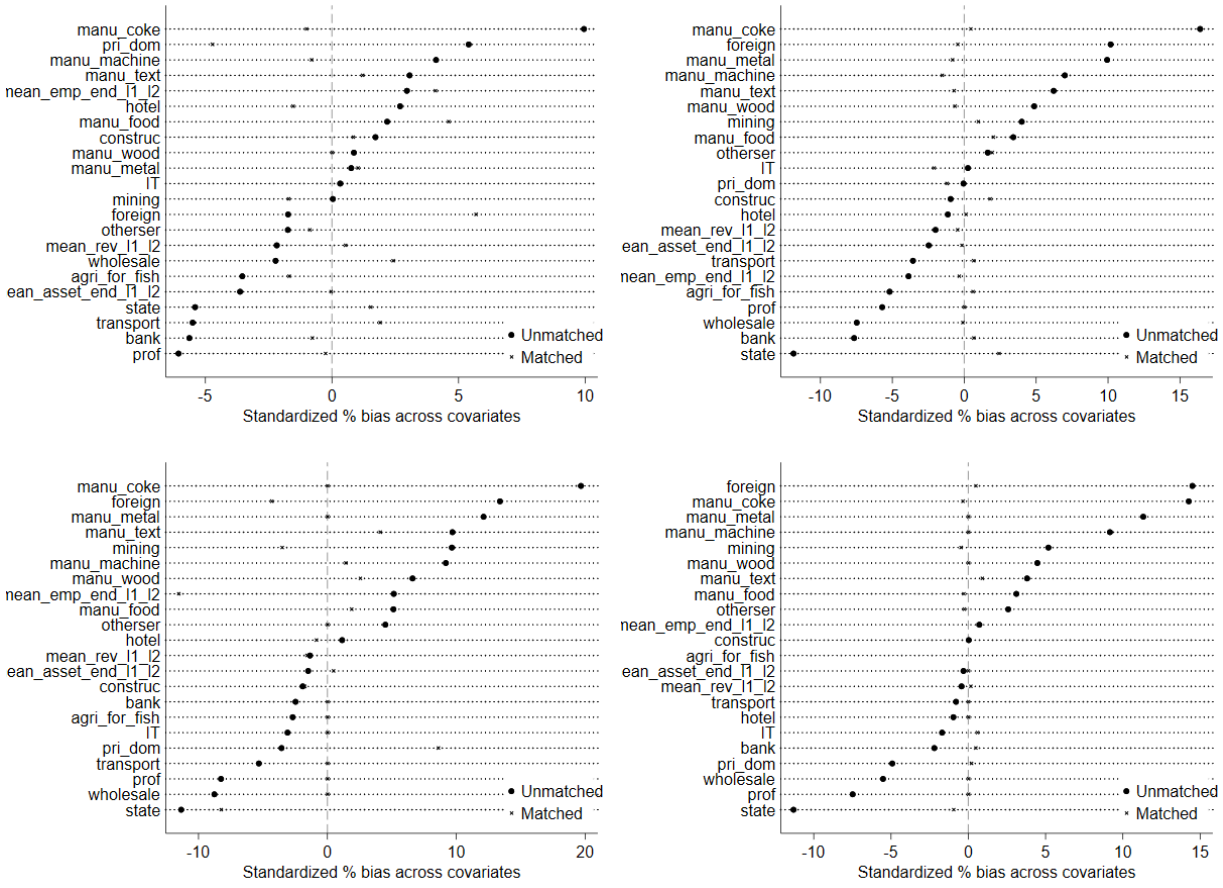


Figure 39: Balanced test between treated and control firms after before and after matching - within SEZ communes

Note: Figure 39 plots the balanced test between treated and control firms before and after matching within SEZ communes. The top left, top right, bottom left, bottom right are for year 2016, 2017, 2018, 2019, respectively.