Tafese, Tevin; Lay, Jann; Van Tran

Working Paper

From fields to factories: Special economic zones, foreign direct investment, and labour markets in Vietnam

GIGA Working Papers, No. 338

Provided in Cooperation with:
GIGA German Institute of Global and Area Studies

Suggested Citation: Tafese, Tevin; Lay, Jann; Van Tran (2023) : From fields to factories: Special economic zones, foreign direct investment, and labour markets in Vietnam, GIGA Working Papers, No. 338, German Institute of Global and Area Studies (GIGA), Hamburg

This Version is available at:
https://hdl.handle.net/10419/279817

GIGA Working Papers

German Institute for Global and Area Studies
Leibniz-Institut für Globale und Regionale Studien

GIGA Research Programme:
Globalisation and Development

From Fields to Factories: Special Economic Zones, Foreign Direct Investment, and Labour Markets in Vietnam

Tevin Tafese, Jann Lay, Van Tran

No 338 **November 2023**

www.giga-hamburg.de/en/publications/giga-working-papers/

GIGA Working Papers **338/2023**

Edited by the
German Institute for Global and Area Studies (GIGA)
Leibniz-Institut für Globale und Regionale Studien

GIGA Research Programme "Globalisation and Development"

WP Coordination and English-language Copyediting: Dr. James Powell
Editorial Assistance and Production: Petra Brandt

All GIGA Working Papers are available online and free of charge on the website
<www.giga-hamburg.de/en/publications/giga-working-papers/>.
For any requests please contact: <workingpapers@giga-hamburg.de>

The GIGA is thankful for the institutional support provided by the Free and Hanseatic City of Hamburg (Ministry of Science, Research, Equalities and Districts) and the Federal Republic of Germany (Federal Foreign Office).

German Institute for Global and Area Studies (GIGA)
Leibniz-Institut für Globale und Regionale Studien
Neuer Jungfernstieg 21
20354 Hamburg
Germany
<info@giga-hamburg.de>
<www.giga-hamburg.de>

From Fields to Factories: Special Economic Zones, Foreign Direct Investment, and Labour Markets in Vietnam

Abstract

Vietnam has integrated into global value chains through the establishment of special economic zones (SEZs). This paper examines the local labour-market impacts of this programme, building on a unique dataset of SEZs in combination with labour force survey (LFS) data. Using historical satellite imagery, we trace the built-up area of SEZs over time to construct a continuous measure of SEZ exposure, which we link to the LFSs at the district-year level for 2013–2019. In a difference-in-differences design with continuous treatment, we find that SEZs have led to a rapid shift in employment from agriculture and services to manufacturing and to an improvement in the quality of employment through higher wages and more formal employment. Foreign firms drive these effects, but there are positive spillovers to workers in domestic firms in agriculture and services. The effects are particularly strong for women, and younger individuals with low and medium levels of education.

JEL classification: J23, J24, J30, J80, O14, O17, O19, P33

Keywords: Vietnam, Special Economic Zones, foreign direct investment, labour markets, structural change, informality

Tevin Tafese

is a Doctoral Researcher at the GIGA Institute for African Affairs as well as at the University of Göttingen, and a member in GIGA Research Programme 3 “Globalisation and Development.”

<tevin.tafese@giga-hamburg.de>

<www.giga-hamburg.de/en/the-giga/team/tafese-tevin>

Apl. Prof. Dr. Jann Lay
is a Lead Research Fellow at the GIGA Institute for African Affairs, the Head of GIGA Research Programme 3 “Globalisation and Development,” and an Adjunct Professor at the University of Göttingen.
<jann.lay@giga-hamburg.de>
<www.giga-hamburg.de/en/the-giga/team/lay-jann>

Van Tran
is a Lecturer as well as Researcher at Ho Chi Minh University of Banking.
<vantq@hub.edu.vn>
<https://hub.edu.vn/>

The authors gratefully acknowledge funding from Germany’s Federal Ministry for Economic Cooperation and Development (BMZ). This paper was written as part of the BMZ-funded “Research Network Sustainable Global Supply Chains.” The contribution to this research by Van Tran was funded by the Ho Chi Minh City University of Banking. We would like to thank Dr. Tran Toan Thang (Ministry of Planning and Investment) for providing the list of SEZs, and Alisha Weber, Nguyen Ngoc Anh Thu, and Pham Thi Thu Thao for excellent research assistance, in particular their tremendous efforts in collecting and reviewing the SEZ data using historical satellite imagery from Google Earth. We would also like to thank colleagues at the GIGA, the Vietnam University of Economics and Law, the Ho Chi Minh City University of Economics, as well as discussants and participants at various seminars and conferences for their constructive comments.

From Fields to Factories: Special Economic Zones, Foreign Direct Investment, and Labour Markets in Vietnam

Tevin Tafese, Jann Lay, Van Tran

Article Outline

1 Introduction

Economic integration into the global economy through trade, foreign investment, and the participation in global value chains (GVCs) is a potentially important driver of economic development and improved labour-market outcomes (World Bank, 2019). Vietnam, which has experienced a deep integration into GVCs over the past 20 years, is a case in point. Its integration into the global economy has been driven by opening up to trade and investment by multinational firms in all major sectors of the economy, particularly manufacturing. Geopolitical tensions and friend-shoring appear to have further contributed to Vietnam's importance in GVCs, including a major increase in the country's market share in United States imports recently (Alfaro and Chor, 2023). Vietnam has received substantial amounts of foreign direct investment (FDI), ranking third in the Global South behind China and India in recent years. This integration has, according to many accounts (for example, McCaig and Pavcnik, 2017), been a key driver of the country's spectacular economic performance and poverty-reduction record.

Much of this foreign investment has gone into the more than 300 special economic zones (SEZs) that have been established across the country, most of which are industrial parks focused on manufacturing and the processing of goods. In this paper, we examine the labour-market effects of these SEZs, thereby investigating a key transmission channel of economic integration to income growth and rising living standards. Through a country-case study with some unique features, we add to several strands of literature that have examined various facets of the development and labour-market effects of place-based policies, FDI, and economic integration, more broadly.

First, firm-level studies, mainly from India (Galle et al., 2023; Hyun and Ravi, 2018) and China (Lu et al., 2019), show that the large-scale SEZ programmes in these countries have been successful in attracting investment, improving firm performance, and increasing employment. The positive impact of SEZs in these countries is in contrast with earlier mixed findings from case studies and cross-country assessments that tend to find that many SEZ programmes failed to attract investment and/or had limited impacts on economic performance and employment (Farole, 2011; Frick et al., 2019). Second, while the labour-market impacts of SEZs in Vietnam have not yet been studied, previous work has highlighted the role of other aspects of the country's economic integration, including its World Trade Organization access and bilateral trade agreements, as important drivers of labour-market outcomes (McCaig et al., 2022; McCaig and Pavcnik, 2018; Baccini et al., 2019). Third, a recent empirical literature that (geospatially) links data on greenfield investment – the typical mode of investing in SEZs – with firm- and individual-level data suggests that these investments affect (local) labour markets, most notably by accelerating the movement out of agriculture (Hoekman et al., 2023; Mendola et al., 2021). Fourth, we add to a literature that uses satellite imagery and information on built productive capacity for economic analysis (Bilicka and Seidel, 2022).

Our study offers three major innovations over previous work. First, by using historical satellite imagery (from Google Earth), we are able to measure the actual built-up size of SEZs over time and use this as a continuous treatment – at the district level – in a difference-in-differences evaluation framework. Second, we construct our outcome variables from nationally representative labour force surveys (LFSs), which allow for a detailed analysis of changes in labour markets induced by SEZs, including: (a) sectoral and occupational changes, i.e. structural change; (b) effects on wages and the quality of employment; and (c) heterogeneous impacts by gender, educational attainment, age, and location (urban/rural). Third, we examine spillover effects and transmission channels of SEZ exposure. We examine and provide suggestive evidence on the role of migration and infrastructure as potential mechanisms here.

Our analysis covers a period of seven years (2013–2019). We estimate the impact of SEZ exposure on local labour markets in a DiD design, using entropy balancing (EB) weights to improve the comparability of the treatment and control districts and the validity of causal inference in DiD designs. We analyse the role of migration and infrastructure as potentially important transmission channels, but also as factors causing selection effects. To address remaining identification concerns related to spillovers, anticipation effects, non-parallel trends, and heterogeneous treatment effects, we employ additional robustness checks based on alternative heterogeneity-robust estimators and samples.

Overall, our results show that the expansion of SEZs has led to (i) a rapid structural shift in employment from agriculture and services to manufacturing. Structural change is reflected in shifts of employment from agricultural and non-agricultural household businesses to wage employment in foreign firms and shifts from agricultural and service occupations to medium-skilled manufacturing occupations.

In addition, we find (ii) improvements in the quality of employment, reflected in higher wages and more formal employment in the treated districts. Importantly, these improvements are not limited to workers in foreign firms in manufacturing, but also benefit workers in domestic firms in agriculture and services, and across high- and low-skilled occupational groups.

There is (iii) considerable heterogeneity in these effects across gender, education, and age as occupational shifts are more pronounced for women and younger individuals with low and medium levels of education. Similarly, women benefit more than men from wage increases in the treated districts and younger individuals with less formal education benefit more than older, more educated individuals.

We (iv) present indicative evidence that migration plays an important role as an adjustment mechanism that accompanies the observed structural changes in labour markets. However, we still observe significant employment and wage changes for long-term residents due to the expansion of SEZs. We confirm that the expansion of SEZs leads to more infrastructure, but we still observe the above effects when controlling for infrastructure expansion. Finally, our analysis suggests that SEZs do not have negative spatial spillovers to labour markets in untreated neighbouring districts without SEZs.

This paper is structured as follows. Following this introduction, section 2 describes the relevant literature and how our study contributes to it. Section 3 provides some background on the Vietnamese SEZ programme. Section 4 presents our data, including descriptive information on our continuous treatment measure of SEZ exposure and key outcomes from the LFS. Section 5 discusses the estimation strategy and identification challenges. Section 6 presents our main results. Section 7 concludes.

2 Related Literature

The findings of this study relate to and contribute to several strands of the literature. First, and most importantly, they address the scarce empirical evidence on the developmental impacts of SEZs in particular and place-based policies in general. While to our knowledge there is no such evidence for Vietnam,[1] several studies have focused on China's and India's large-scale SEZ programmes.[2]

Studies on China mainly find positive development effects from the country's economic zones (EZs) programme, which allocated more liberal laws and economic policies to specific geographical regions within the country. For example, exploiting differences in the timing of EZ creation across municipalities, Wang (2013) finds that EZs were a powerful tool for attracting FDI to China, increasing the level of per capita FDI by 21.7 per cent and the growth rate of FDI by 6.9 percentage points (p.p.) in municipalities located in EZs with no evidence of crowding out of domestic investment. In another study, using firm census data between 2004 and 2008 and a DiD design, Lu et al. (2019) find that EZs increase employment (by about 30 per cent), output, and capital, and the number of firms in villages that are located in EZs relative to villages not located in EZs, especially in capital-intensive industries relative to labour-intensive industries. The effects are mostly driven by firm entry and exit rather than by incumbents and relocations.

For India, the evidence is more mixed. On the one hand, Alkon (2018) finds no positive development spillovers in municipalities with SEZs across a range of socio-economic and infrastructure indicators. Similarly, Gorg and Mulyukova (2022) find no positive productivity effects for firms within SEZs once selection is taken into account, and even negative effects for firms near SEZs. On the other hand, the studies by Galle et al. (2023) and Hyun and Ravi (2018) find large and positive development effects accompanying India's SEZ programme, reflected in formal-employment growth and shifts from agriculture to manufacturing and services. While these contradictory findings are difficult to reconcile, some ambiguity may be due to the different foci of the studies and the use of different data sources. Gorg and Mulyukova (2022) essentially compare SEZ and non-SEZ firms, while Alkon (2018) studies broader development impacts. In contrast, the studies by Galle et al. (2023) and Hyun and Ravi (2018) focus on structural employment effects and incorporate data on informal production and employment from different data sources[3] to account for transitions between the two sectors.

Second, this paper relates to a growing literature that focuses on the local development and labour market effects of FDI, typically by linking greenfield investment data to firm- and individual-level data. For example, Hoekman et al. (2023) use micro data on more than 40

1 An exception is the (unpublished) study by Tien and Huong (2020), who document positive effects of SEZ assignment on FDI inflows for the period 2011–2015.

2 Note that there is also a larger cross-country literature that generally finds rather mixed evidence on the performance and potential of SEZs for (direct) job creation (Farole, 2011; Frick et al., 2019).

3 To cover both the formal and informal sectors, Galle et al. (2023) use data from the population census and Hyun and Ravi (2018) use data from the Unorganised Manufacturing and Services Quinquennial Survey.

million individuals, which they match to the presence of greenfield projects in about 2,500 subnational geographic units over the period 1987–2019. They find that the presence of projects is correlated with employment growth and a shift of workers into modern industries and higher-skilled occupations, as well as positive horizontal spillovers and inter-industry linkages to domestic firms. Using a very similar approach and data from the Demographic and Health Surveys (DHSs), Mendola et al. (2021) find a 6.7 p.p. increase in off-farm employment in households in close geographic proximity to a foreign multinational enterprise affiliate in sub-Saharan Africa. In addition, two recent studies examine the employment effects of greenfield FDI in Ethiopia using a DiD approach. Abebe et al. (2022) find that large greenfield investments increase employment in domestic manufacturing firms by 24 per cent, or about 20 employees per firm on average, and increase the entry of local firms by 47 per cent. Focusing specifically on Chinese FDI, Crescenzi and Limodio (2021) find positive effects on employment in domestic firms in supplier and buyer industries, on the one hand, and negative effects on employment in domestic firms in the same sector, on the other.

Third, our paper contributes to a growing body of research that examines the broader development and labour-market effects of economic integration – through trade or FDI – in the presence of labour-market distortions such as high rates of informality.[4] Several studies have looked at the case of Vietnam. For example, McCaig and Pavcnik (2018) focus on the labour-market effects of Vietnam's 2001 bilateral trade agreement (BTA) with the US, using nationally representative household data from two waves of the Vietnam Household Living Standards Surveys (VHLSs). The authors show that in industries where tariff reductions were larger as a result of the BTA, there is a movement of workers from the predominantly informal household business sector to the formal enterprise sector, and that the BTA increased aggregate labour productivity by 2.8 per cent per annum in the two years following the conclusion of the BTA through the re-allocation of employment from the formal to the informal sector.

In a follow-up paper on the long-term effects of the BTA, McCaig et al. (2022) show that industries with larger tariff reductions experience higher rates of entry by private and foreign-owned firms. Importantly, however, only the entry of foreign-owned firms – especially exporters – contributes to employment growth. Private domestic firms are small at entry and do not subsequently grow thereafter. In addition, several very recent papers show that Vietnam has been one of the main beneficiaries of the growing trade tensions between the US and China in recent years, as trade has partly diverted from China to Vietnam. Exploiting the variation in US tariff increases on Chinese imports across industries, these studies find that Vietnamese districts that are more exposed to the trade war experience higher employment, working hours, and wages (Mayr-Dorn et al., 2023; Rotunno et al., 2023), as well as a shift in employment from informal agriculture to formal manufacturing (Nguyen and Lim, 2023).

4 We will only focus here on studies on Vietnam, although similar evidence exists for other countries/regions: notably, Brazil (Dix-Carneiro and Kovak, 2019; Ulyssea and Ponczek, 2018) and Africa (Erten et al., 2019; McMillan and McCaig, 2019).

Fourth, methodologically, our paper is related to recent work by Bilicka and Seidel (2022), who investigate whether nightlight data can serve as a good predictor of the economic activity of small spatial units such as firms. They focus on the world's 18-largest car manufacturers and match information on the footprints of their production sites with nightlight and firm financial data. While they show that nightlight data explain a large 80 per cent of the variation in firm sales across factories, a much smaller variation (29 per cent) in firm sales over time can be explained by nightlight. More importantly for the sake of our study, however, the authors also find that changes in the area occupied by factories predict changes in turnover to a much greater extent (80 per cent) than light intensity does.

The above literature highlights the potential importance of FDI and foreign firms for the success of SEZ programmes. In Vietnam in particular, the entry of foreign firms appears to have been an important driver of employment creation through trade integration. Overall, the literature provides hints that positive impacts on local development cannot be taken for granted. Yet, most of the evidence, including from Vietnam, suggests that structural changes in local labour markets are likely to be a key transmission channel for the impacts of SEZs, FDI, or economic integration more generally. The empirical studies, particularly those on the labour-market impacts of SEZs and FDI, rely on imperfect data on both labour-market outcomes and "treatment" variables. Firm-level data typically contain little information on employees, and DHS data provide little detail on employment beyond broad sectoral classifications. Such shortcomings limit the study of transmission channels. The papers cited above on the impact of SEZs all use a dichotomous treatment variable – that is, they compare SEZ-exposed firms, individuals, and locations with non-exposed ones. Data on greenfield investment are notoriously incomplete, and even more so when precise geographical locations are required.

Our study addresses some of these shortcomings. By using historical images of the built-up area of SEZs to construct a continuous treatment variable of SEZ exposure that varies over time, we improve on existing measures in two main ways. First, our measure arguably identifies the start of SEZ operations more precisely, based on the date when the actual area of an SEZ is first covered by structures such as factories and sheds, compared to existing studies that rely on other, presumably less precise sources such as media reports. Second, we allow for differences in activity across SEZs and over time, which is important because the size of SEZs is known to vary considerably – also over time.

Moreover, the detailed labour-market outcome data from the LFSs allow for a fine-grained analysis of the impact of SEZs on structural shifts in employment across disaggregated sectors and occupations – from informal to formal employment and from domestic to foreign firms. We can also examine wages, which many of the above studies cannot observe, and other indicators of the quality of employment. Further, we can study the underlying mechanisms, in particular migration and the expansion of infrastructure. Finally, our large sample allows us to tease out heterogeneous effects by gender, educational attainment, age, and district type (urban versus rural).[5]

3 Background on Vietnam's SEZ Programme

In this section, we provide an overview of Vietnam's SEZ programme and highlight its main features. Along with China and India, Vietnam is one of the most prominent examples of a country pursuing an SEZ-led development strategy. The left panel of Figure 1 below, based on an inventory of SEZs provided to us by the Ministry of Planning and Investment (MPI), shows that the country first started developing SEZs more than 30 years ago, in the early 1990s, and that the number of SEZ approvals – including both established SEZs and those still in the planning stage – increased rapidly, especially after the year 2000.[6] By 2020, a total of 608 SEZs had been approved.[7] The majority of SEZs (538) are industrial parks (IPs), which are clearly demarcated areas dedicated to the production of industrial goods and the provision of services to support industrial needs, while 70 are EZs, which are geographically defined areas established to attract investment, promote socio-economic development, and ensure national defence and security.[8]

In terms of their distribution across the country, the right panel of Figure 1 shows that Vietnam's 608 approved SEZs are spread across all 58 provinces and 5 municipalities, although they are more concentrated along the coast and around the economic centres of Ho Chi Minh City in the south and Hanoi in the north. Most SEZs have been established or are being planned in the provinces of Long An (48), Dong Nai (37), and Binh Duong (35). The majority of SEZs in Vietnam are "mixed sector zones," meaning that they host firms engaged in a variety of different (manufacturing) activities rather than just one very specific activity.[9] However, some manufacturing subsectors – such as electronics, machinery, food, mineral products, and textiles and apparel – are disproportionately represented in SEZs.[10]

5 Since we do not know the exact location of individuals from the LFSs, only the district in which they live, we aggregate our SEZ exposure measure at the district-year level to match it with the individual-level LFSs.

6 Vietnam's SEZ programme, especially in its early years, was closely modelled after Taiwanese SEZs and influenced by Taiwanese investors who provided critical technical and financial support (for details, see Tang, 2022).

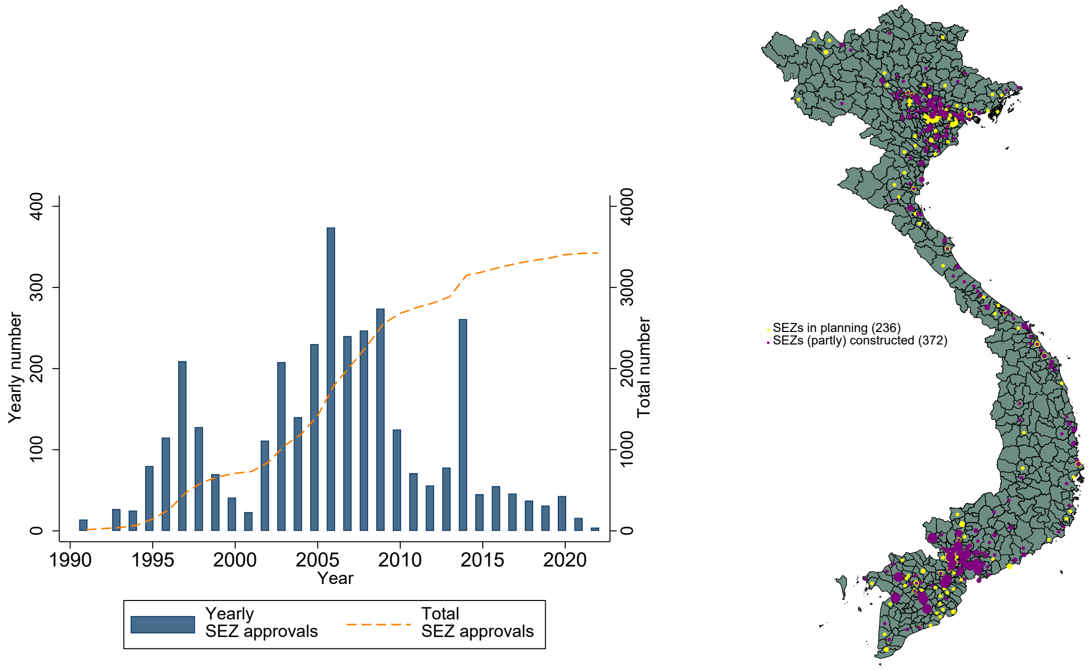
7 The peak in 2014 is likely to be related to the adoption of the 2014 Enterprise Law, which provides a comprehensive legal framework to support enterprises and promote investment in the country.

8 IPs are further subdivided down into export processing zones, auxiliary industrial areas, and eco-industrial zones. In comparison, EZs include coastal EZs and border-gate EZs. The definition and regulation of SEZs in Vietnam is currently governed by Article 2 of Government Decree No. 82/2018/NĐ-CP, which came into effect in 2018.

9 In this respect, Vietnam's SEZ programme differs from that of other countries such as India, where each SEZ typically focuses on a specific sector.

10 Distribution of SEZs in the most common manufacturing subsector: electronic products and electrical equipment (388), machinery and equipment (353), food products (316), non-metallic mineral products (249), and textiles and apparel (242).

Figure 1. SEZ Approvals (left) and Location (right)



Source: Authors' own compilation, based on data from the MPI.
Notes: The total number of approved SEZs is 580. For 28 SEZs, information on the approval year is missing.

Regarding the planning and development of SEZs, under Vietnam's regulations the MPI is given primary responsibility here in line with the overall national socio-economic development strategy, as well as with land-use planning at the national and provincial levels.[11] All SEZs must be approved by the Prime Minister and be included in the country's ten-year National Master Plans (NMPs); once a NMP is in place, no new SEZs can be added. However, the inclusion of SEZs in the NMPs is not a top-down decision taken by the MPI and the Prime Minister alone, but one reached in close cooperation with other relevant ministries and sectoral administrations, as well as subnational administrations – especially at the provincial level. The Provincial People's Committees (PPCs), the executive at the provincial level, have a say in how many SEZs are included in the NMP, where they are located, and what areas they are supposed to cover.[12] The PPCs also decide on the use of public funds to support investment in technical infrastructure systems inside and outside the SEZs, and issue specific preferential and incentive policies in accordance with the country's legal provisions.

In terms of their actual establishment, private and public investors can submit proposals to the respective PPCs for the development of SEZs that are included in the NMP. Importantly, as we have learned from discussions with private developers, investors tend to prefer sites that have the appropriate infrastructure (such as access roads) to support an SEZ project. Once the SEZ development plan has been approved by the PPC, investors can begin to develop the

11 See Article 3 of chapter II in decree No.82/2018/NĐ-CP.

12 See Article 60 of chapter V in decree No.82/2018/NĐ-CP.

physical infrastructure of the SEZ, such as buildings, access roads, and the power grid.[13] Premises and land in the SEZs can be leased out to other (foreign) enterprises in accordance with the law on construction. The Provincial Management Boards of the SEZs, which are closely linked to the PPCs, are responsible for the operational-management functions of the SEZs, including the provision of public administrative services and other ancillary services related to investment, production, and business activities in the SEZs.[14] Overall, the allocation, planning, and establishment of SEZs in Vietnam is quite decentralised and competitive, driven by a mix of some top-down elements and much bottom-up engagement, with a central role for provincial governments and private sector influence (Tang, 2022). Appendix A.1 summarises the main steps involved.

Companies with investment projects in SEZs benefit from preferential tax and customs regimes.[15] Specifically, companies investing in export processing zones (EPZs), which are IPs dedicated to the production of export goods, and EZs enjoy corporate income tax (CIT) exemptions for the first two and four years, respectively, followed by tax deductions in subsequent years. EPZs do not levy duties on exported goods or on imported goods for processing into export goods. In addition, both EPZs and EZs are exempt from customs duties on imports meant for capital investment and on imported materials not produced locally for five years from the date of their establishment. Moreover, investment projects within these zones are granted preferential conditions for land rent and investment loans. Additionally, expenses related to the construction, operation, and rental of housing and other social infrastructure are deductible for CIT purposes and are eligible for certain incentives. Overall, Vietnam's tax and customs regime is very lenient and designed to attract (foreign) investment.

4 Data

We use two main data sources to assess the impact of SEZs on labour-market outcomes. First, we construct our continuous treatment variable, SEZ exposure at the district-year level, from an original dataset of geo-referenced Vietnamese SEZs, which we generate using historical Google Earth satellite imagery. Second, we measure labour-market outcomes using the nationally representative Vietnamese annual LFSs, collected by the General Statics Office of Vietnam. We limit our analysis to the period 2013–2019, mainly because high-quality satellite imagery

13 See Article 31 of chapter III in decree No.82/2018/NĐ-CP.

14 See Article 61 of chapter VI in decree No.82/2018/NĐ-CP.

15 The most comprehensive, clear, and up-to-date overview of investment incentives in Vietnam's SEZs that we could find is in the report "Doing Business in Vietnam 2022" by EY and the Vietnam Foreign Investment Agency on page 30 of the following: https://www.ey.com/en_vn/doing-business-in-vietnam-2022.

has only been available since the late 2000s, and only became regularly available for most SEZs a few years later.[16]

4.1 Measuring SEZ exposure from satellite imagery

A major innovation of this paper over previous work is that we use a continuous treatment variable, namely SEZ exposure at the district-year level. We construct this measure using historical Google Earth satellite imagery, which allows us to trace changes in the actual built-up area of Vietnamese SEZs over time. We, first, measure the built-up area for each of the *k* SEZs (in district *j* in year *t*). Since we conduct our empirical analyses at the district-year level, we then aggregate the built-up area of all SEZs in the same district *j* in the same year *t* to obtain the following continuous treatment variable at the district-year level:[17]

$$\text{SEZ\_exposure}_{\text{jt}} = \sum_{k=1}^{N} SEZ\_area_{kjt}$$

Once we have calculated this SEZ exposure for each district and each year, we can match it to the annual Vietnamese LFSs at the district-year level. Using a continuous variable of SEZ exposure as measured by the total built-up area of SEZs (in a district in a given year) has the advantage of more precisely identifying the start of SEZ operations and allowing for differences in activity across SEZs and over time, as supported by the evidence provided by Bilicka and Seidel (2022).

To construct the above district-year variable of SEZ exposure, we map the built-up area of each Vietnamese SEZ in each year – the term SEZ_area_{kjt} – using historical satellite imagery from Google Earth. We start with the list of all approved SEZs provided by the MPI, which includes information on the name of the zone and its home district, among other variables. Using this information, we can first identify the exact location (longitude and latitude) of the SEZ in Google Earth.[18] We then use Google Earth's polygon feature to manually draw a polygon around the built-up area of an SEZ in the most recent Google Earth image available, which is typically from 2019 to 2021. We take advantage of the fact that the built-up area of SEZs can generally be readily identified by the factories and sheds that occupy the space within the SEZs' boundaries.[19] We then use Google Earth's historical imagery to go back in time and re-

16 For LFS waves before 2013, information on the district of residence of individuals is not available. Further, earlier waves follow a different International Conference of Labour Statisticians standard (ICLS 13 vs. ICLS 19), which makes comparisons before and after 2013 difficult.

17 We can easily aggregate the built-up area of all the SEZs in the same district because we know the coordinates of each SEZ.

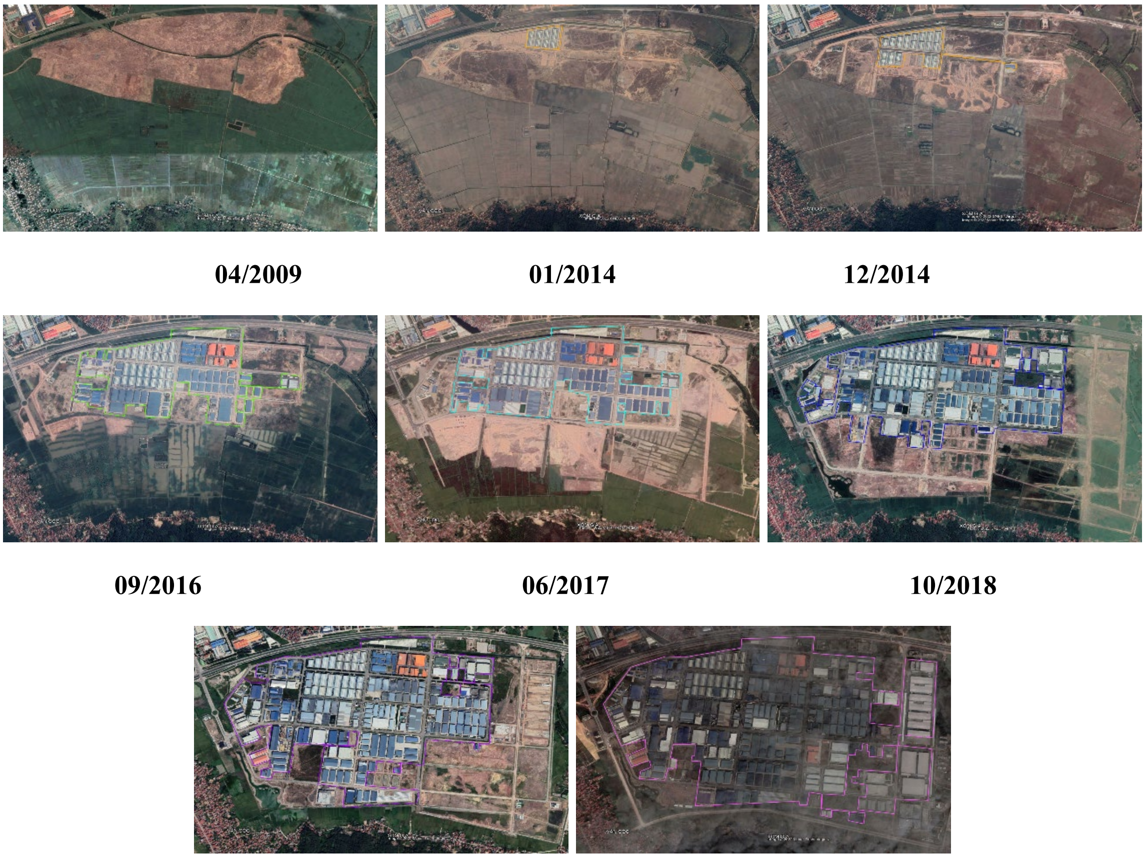
18 If an SEZ cannot be found by searching within Google Earth Pro, we use a web search to locate it.

19 This applies to both IPs and EZs. While it is easy to identify IPs because of their clear boundaries, it can be more difficult for EZs – which are defined by much wider geographical boundaries. For EZs, however, the functional zones that mobilise capital are usually concentrated in specific locations and can be identified.

peat the exercise on past imagery at yearly intervals until no built structures are visible. Following these steps, we have mapped a total of 372 SEZs using historical satellite imagery, while 236 have only been approved but do not yet have any built-up area visible.[20]

As an example, Figure 2 below shows the expansion of the SEZ Van Trung in Viet Yen District, Bac Giang Province, and how we mapped it using manually drawn polygons. The earliest high-quality image of Van Trung's designated location is from 04/2009. Although Van Trung was approved in 2009, at that time the zone was not yet operational and no sheds were visible – this is true of many SEZs, which expand only some years after approval. The first time that sheds – eight of them to be exact – are visible for Van Trung is in the 01/2014 image, covering an area of 4.7 hectares. From that year onwards, polygons were drawn around Van Trung's sheds and other built-up areas to measure the area of the zone over time. In the most recent image, dated 12/2020, Van Trung's built-up area had increased to 256.8 ha.

Figure 2. The Expansion of SEZ Van Trung

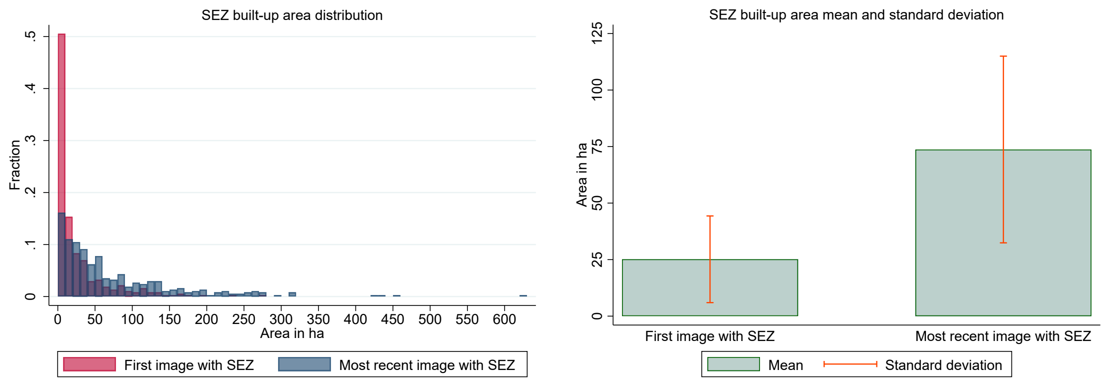


Source: Google Earth Pro.
Note: The figure shows the expansion of the SEZ Van Trung over time via satellite imagery.

20 For SEZs in the planning stage, the factories and sheds are not yet visible on satellite imagery; however, the designated land on which the SEZ will be built can often be detected because it has already been cleared.

As high-quality imagery generally became available in the late 2000s and regularly in the early to mid-2010s for most SEZs (Appendix Figure 2), as is also the case for Van Trung, we can more accurately trace the expansion occurring in more recent years and for younger SEZs. As a result, among our 372 mapped SEZs, we can trace the full growth in built-up area from an initial image with zero built-up area for 155 SEZs and partial growth from an initial image with non-zero built-up area for 217 SEZs (see Appendix A.1 for more details on the mapping). The increasing availability of images in recent years is also the main reason why we focus on the period 2013–2019 in our empirical analysis, which exploits annual variation. For some SEZs, such as Van Trung in 2013 and 2015, we do not have the full series of annual images between 2013 and 2019, however. Fortunately, the proportion of missing values is rather small, at 13.7 per cent of all SEZ-year observations. We impute these missing values of built-up area using linear interpolation.[21]

Figure 3. SEZ Size Distribution and Expansion Over Time



Notes: Both plots are based on the 372 SEZs established by 2019. The left plot shows a histogram of the distribution of SEZ size, measured in terms of built-up area, in the first image in which an SEZ is visible and in the most recent image in which an SEZ is visible. The bins are shown in 10 ha units. The right plot shows a bar graph of the average SEZ size in the first and most recent image and their respective standard deviations.

Comparing the average built-up area in the first and most recent available image, Figure 3 above shows a significant growth of SEZs over time: in the first image, more than 50 per cent of SEZs had less than 10 ha of built-up area, compared to only about 16 per cent in the last images (left panel), with the average built-up area roughly tripling from 25.1 ha to 74.3 ha (right panel).[22] This average masks huge variation in the size of SEZs, which is reflected in the large standard deviations of the built-up SEZ area in the first and most recent satellite images (Figure 3, left panel) and a very long tail in the (log-normal) distribution of the built-up SEZ

21 In section 6.8, we verify that our results are robust to leaving the values for the gap years as missing.

22 On average, there are 9.3 years between the first and most recent image. Growth in a built-up area is not always linear over time. See, for example, the slow expansion of SEZ Van Trung between 01/2014 and 12/2014 compared to the fast expansion between 10/2018 and 10/2019.

area, especially in the most recent image (Figure 3, left panel). For example, Van Trung grew almost 30-fold from 9.3 ha in January 2014 to 256.8 ha in December 2020.

After aggregating the built-up area in each of Vietnam's 708 districts for each year between 2013 and 2019, we can classify districts into one of four groups using the inventory of planned SEZs and our exposure measure of SEZ built-up area. Namely, districts that: (i) are not planning SEZs and therefore not exposed between 2013 and 2019 (420); (ii) are planning SEZs but have not yet been exposed to actual SEZ activity (88); (iii) had no operational SEZ – that is, with a built-up area greater than 0 – in 2013 but at least one by 2019 (19); and (iv) already had at least one operational SEZ in 2013 (181). Accordingly, as shown in Table 1 below, districts in Groups I and II have no SEZ exposure in both 2013 and 2019, while districts in Group III have no SEZ exposure in 2013 but an average SEZ exposure of 65 ha in 2019. Districts in Group IV already have an exposure of 77.5 ha in 2013, which increases to 139.7 ha in 2019.

Table 1. SEZ Exposure by District Group

District type	Number of districts	Mean area		SD area	
		2013	2019	2013	2019
Group I: Never exposed to an SEZ and none is planned	420	0	0	0	0
Group II: Never exposed to an SEZ, but one is planned	88	0	0	0	0
Group III: Exposed to an SEZ after 2013	19	0	65.0	0	141.5
Group IV: Always exposed to an SEZ	181	77.5	139.7	138.9	216.3

Note: "Area" refers to the total built-up SEZ area in a district measured in ha.

4.2 Labour-market outcomes and sources of impact heterogeneity

We examine the impact of SEZ exposure on local labour markets using individual-level outcomes from the annual LFS, which is representative of the Vietnamese labour force of about 70 million people. We use seven waves of the LFS between 2013 and 2019, at each of which households are randomly resampled – meaning our sample is a repeated cross-section at the household level. The survey provides detailed information on the employment status and occupation of respondents, as well as on the characteristics of their employers. The LFS covered all 678 districts in 2013 and 708 in 2019, of which 63.3 per cent were rural in 2019.[23]

We restrict our sample to individuals of working age, meaning aged between 15 and 65 years old at the time of the survey, which gives us 500,000–560,000 observations on 300,000–340,000 working age individuals living in around 100,000 households. The total number of observations in each wave exceeds the number of individuals because most individuals are surveyed twice within the same wave to capture seasonal variations in labour markets. To avoid including the same individual from the same wave twice and artificially inflating our sample size, we randomly select a single observation for each individual, resulting in a total

23 The district level is the second level of administration, after the province level and before the commune level, which are the first and third levels of administration in Vietnam, respectively. For details on the distribution of districts in the LFSs and on the sampling procedure, see Appendix A.2.

of 2,244,347 observations across all waves. Our large sample with detailed employment-related information allows us to make novel contributions with respect to the labour-market effects of SEZs in four areas.

First, the LFSs allow us to capture various dimensions of labour-market participation and employment-related structural change, including changes in employment categories (e.g. wage employment and self-employment), the types of employers (e.g. household business, private domestic firm, private foreign firm, and state-owned firm), sectoral employment (e.g. agriculture, manufacturing, and services), and occupational changes (e.g. elementary and skilled occupations in agriculture; machine operators and clerks in manufacturing).[24] These different dimensions of structural change overlap, for example when individuals move from informal self-employment in agriculture to formal wage employment in manufacturing.

Second, we can examine the impact of SEZs on wages and other indicators of employment quality, including the contractual nature of employment (e.g. no contract vs. permanent contract) and workers' social security contributions. Because we have details on an individual's employer, we can examine the impact on wages in different types of firms (for example domestic vs. foreign). This is also true regarding different types of activities and occupations (certain occupations in manufacturing vs. others in services).

Third, we can analyse whether impacts are heterogeneous across different groups of individuals. As the impacts on male and female workers differ considerably for many of the variables of interest, we decided to allow for gender differences in impacts throughout. Further, we analyse differential impacts by education, age, and type of district.

Fourth, the LFSs contain information on the migration status of individuals, the reason for migration, and the province of origin of migrants. As such, we can also examine the role of migration as a transmission channel of SEZs to local labour-market outcomes. We conduct a similar transmission channel analysis for infrastructure development using additional data from OpenStreetMap (OSM).

There are two caveats to using the LFSs for our analysis. First, we do not know whether the employer is located in an SEZ, so we cannot clearly distinguish the "direct effect" on workers in firms operating inside the SEZ from the "indirect effects" on workers in firms operating outside the SEZ within the same district. However, since we have details on an individual's employer, we can still analyse the effect of SEZ presence on the likelihood of working in a particular type of firm that tends to be located inside or outside SEZs. For example, foreign firms, especially in manufacturing, are almost exclusively located in SEZs, so changes in employment in foreign firms in the treated districts are likely to be the direct effect of the expansion of SEZs in that district. In contrast, household businesses are never located in SEZs, so changes in employment in this type of business in treated districts are likely to be an indirect effect.

24 Employment in sectors is derived from ISIC Rev. 4 codes at the 4-digit level and occupations are derived from ISCO-08 codes at the 4-digit level.

Second, we do not know the exact location of an individual or household, and therefore its distance from an SEZ. We hence match our measure of SEZ exposure and our individual-level outcomes at the district level. Given the relatively small size of the districts, one (identification) concern with this district-level approach is that individuals in untreated neighbouring districts may be affected by SEZs in treated districts, which would bias our estimates. We discuss this in more detail in the next section.

Table 2 below presents summary statistics for our sample in the first (2013) and last (2019) year of our study, both in aggregate and by district exposure group. The first three columns show that the Vietnamese labour market has undergone very significant change over our study period. The share of own-account and family workers in agriculture fell by more than 10 p.p., from 63 to 52.5 per cent, while the share of wage workers increased by roughly the same amount, from 34.6 to 44.7 per cent. Accordingly, employment mainly shifted from agricultural (-3 p.p. or -6.6 per cent) and non-agricultural (-1.9 p.p. or -6.1 per cent) household businesses and, to a lesser extent, state-owned enterprises (-1.1 p.p. or -35.5 per cent), to domestic private (5.5 p.p. or 71 per cent) and foreign enterprises (2.5 p.p. or 92 per cent).[25] In line with these changes, there were large shifts in employment from agriculture (8 p.p. or 19 per cent) to manufacturing (5 p.p. or 39 per cent) in particular, but also to construction and services (third panel). The shift in employment across firms and sectors is also reflected in changes in occupations, with a decrease in skilled and unskilled agricultural workers and an increase in machine operators and assemblers and craft workers, as well as in professional and sales and personal-service workers.

25 Vietnamese law distinguishes between the household business sector and the registered enterprise sector. The latter is subject to stricter requirements under the Enterprise Law in terms of accounting procedures and reporting on the financial position of the enterprise and its workforce.

Table 2. Sample Characteristics, 2013 and 2019

	Total			Group I: Never exposed, not planned			Group II Never exposed, planned			Group III Exposed after 2013			Group IV Always exposed		
	2013	2019	Change (pp)	2013	2019	Change (pp)	2013	2019	Change (pp)	2013	2019	Change (pp)	2013	2019	Change (pp)
	Col %	Col %		Col %	Col %		Col %	Col %		Col %	Col %		Col %	Col %	
Type of worker															
Own-account and unpaid family workers	63	52.5	-10.5	68.7	59.2	-9.5	62.8	54.3	-8.5	60.9	49.7	-11.2	52.1	40.8	-11.3
Wage workers	34.5	44.7	10.2	29.1	38.3	9.2	35.1	42.7	7.6	36.5	48.3	11.8	44.9	55.9	11
Other workers	2.4	2.8	0.4	2.2	2.6	0.4	2.1	3	0.9	2.6	2	-0.6	3	3.3	0.3
Total observations	248,298	252,695		141,483	135,785		29,272	30,401		5,587	6,010		71,956	80,499	
Employer firm															
Agricultural household	45.4	42.4	-3	54	51.1	-2.9	45.5	44.1	-1.4	42.1	34.4	-7.7	28.9	27.5	-1.4
Non-agricultural household	30.9	29.1	-1.8	26.5	26	-0.5	32.8	31.5	-1.3	36.9	34.5	-2.4	38.5	32.9	-5.6
Private domestic enterprise	7.5	13	5.5	5.7	10.6	4.9	6.2	10.6	4.4	6.8	11.1	4.3	11.6	18	6.4
State-owned enterprise	3.1	2	-1.1	2.3	1.6	-0.7	4	2.5	-1.5	2.3	1.9	-0.4	4.2	2.5	-1.7
Foreign enterprise	2.5	5	2.5	0.9	2	1.1	2.3	3	0.7	4	11.8	7.8	5.8	10.4	4.6
Other organization	10.5	8.6	-1.9	10.6	8.8	-1.8	9.2	8.4	-0.8	7.8	6.2	-1.6	11.1	8.7	-2.4
Total observations	247,616	252,695		141,056	135,785		29,195	30,401		5,578	6,010		71,787	80,499	
Employer sector															
Agriculture	46.3	37.3	-9	54.7	46.2	-8.5	47.1	39.7	-7.4	43.2	30.5	-12.7	29.6	21.9	-7.7
Manufacturing	11.9	16.8	4.9	7.7	11.2	3.5	12.4	16.4	4	15.1	24.5	9.4	19.6	25.8	6.2
Construction	6.8	9	2.2	5.4	8	2.6	7.5	10	2.5	9.8	12.4	2.6	8.8	10.1	1.3
Services	35.1	36.9	1.8	32.1	34.6	2.5	33	33.9	0.9	31.9	32.6	0.7	42	42.2	0.2
Total observations	248,298	252,695		141,475	135,785		29,276	30,401		5,588	6,001		71,957	80,499	
Type of occupation															
Skilled agricultural workers	9.7	7.2	-2.5	10.1	8.4	-1.7	12.9	9.7	-3.2	9.3	4.3	-5	7.8	4.4	-3.4
Unskilled agricultural workers	36.3	29.8	-6.5	44.3	37.5	-6.8	33.7	29.3	-4.4	33.5	26.1	-7.4	21.6	17.2	-4.4
Machine operators and assemblers	7.2	11	3.8	4.8	7.1	2.3	7.7	10.5	2.8	10.8	19.2	8.4	11.5	17.2	5.7
Craft workers	12.6	15.5	2.9	9.8	13.3	3.5	13.6	17.1	3.5	16	19.2	3.2	17.4	18.5	1.1
Professional services workers	12.3	12.9	0.6	11.9	12.2	0.3	10.4	10.4	0	8.5	8.1	-0.4	14.4	15.3	0.9
Sales and personal services workers	21.9	23.6	1.7	19.1	21.5	2.4	21.8	22.9	1.1	21.9	23.1	1.2	27.4	27.5	0.1
Total observations	247,529	252,070		141,111	135,515		29,179	30,324		5,582	6,004		71,657	80,227	

Notes: Employer sector classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of "G-U" in Services, and those with a code that is part of "B," "D," "E," and "F" in Construction. Occupation classifications follow ISCO-08 codes. Skilled agricultural workers have the code "6," elementary agricultural workers have the code "92," machine operators/assemblers have the codes "8"and "932," craft workers have the codes "7" and "931," professional-service workers have the codes "1–3," and sales and personal-service workers have the codes "4" and "52–59."

The remaining columns in Table 2 show the sample characteristics in 2013 and 2019 by the four SEZ exposure district groups from Table 1 above. In general, there are large differences between the districts of the four groups in terms of the type of employment in the baseline year 2013; as we move from Group I to Group IV: (i) the share of own-account workers decreases and wage work increases; (ii) employment in household businesses decreases and in private domestic and foreign enterprises increases; and (iii) employment in the agricultural sector/occupations decreases and in the manufacturing sector/occupations increases. While the previously documented shifts between 2013 and 2019 apply to all four groups, they are more pronounced for Group III and IV districts that had some exposure to SEZs during this time period. In particular, in Group III districts where an SEZ was established for the first time after 2013 there was a strong shift in employment from own-account and unpaid family work to wage work, and from agriculture and household businesses into manufacturing and foreign enterprises.

5 Estimation Strategy

5.1 Baseline specification and estimation

As our baseline specification, we use a DiD design with continuous treatment, which we implement using the following two-way fixed effects (TWFE) regression specification:

$$y_{ijt} = \beta_0 + \beta_1 SEZ\_exposure_{jt} + \beta_2 SEZ\_exposure_{jt} \text{ X } Male_{ijt} + \beta_3 IX_{ijt} + \gamma_t + \gamma_j + \varepsilon_{ijt} \quad (1)$$

where y_{ijt} is the outcome of interest for individual *i* in district *j* at time *t*, taken from the annual LFSs. $SEZ\_exposure_{jt}$ is our continuous treatment variable, measuring the total built-up SEZ area in district *j* at time *t*. We measure $SEZ\_exposure_{jt}$ in 100 ha, as this roughly corresponds to the average built-up SEZ area in treated districts during our study period. SEZ_{jt} X $Male_{ijt}$ is an interaction term between SEZ exposure and a male dummy variable that measures the differential effect of SEZ exposure on men and women, which may differ because the majority of workers in Vietnam's export-oriented industries concentrated in SEZs, such as electronics and garments, are women. In other sets of regressions, we replace the male dummy in the interaction term with variables for an individual's level of education, age, and type of home district to examine differential effects by education, age, and urban versus rural districts.

IX_{ijt} is a vector of controls for individual *i* in district *j* at time *t*, including the individual's gender, age, and educational attainment. γ_t and γ_j are year and district fixed effects, so our coefficients of interest β_1 and β_2 are identified from the correlation between the change in the average labour market outcome for women and men, respectively, in a district and the change in the total built-up SEZ area in a district. ε_{ijt} are standard errors, which are clustered at the district level.

We estimate our baseline TWFE specification (1) using EB weights (Hainmueller, 2012) to balance covariates across treated and control districts. We compute weights at the district level because SEZ exposure varies at this level, and use as balancing covariates the district-level baseline values[26] of the average age of individuals, the proportion of individuals with different levels of education, and the type of district (rural/urban) – all variables that are likely to affect the SEZ allocation across districts. Note that since weights are computed at the district level from baseline values, individuals from the same district are assigned the same weight in the regression across all waves.

The use of EB weights essentially results in a synthetic control group that is matched to the treatment group on the balancing covariates. This has the advantage of reducing concerns about selection and non-parallel trends and improving the validity of causal inference in our TWFE specification (Cefalu et al., 2020). Simultaneously, it helps maintain a large sample that allows for extensive heterogeneity analyses.

5.2 Mechanisms and identification challenges

While our TWFE regression specification (1) with EB weights serves as a good baseline framework, there remain threats to the identification of our causal parameters of interest β_1 and β_2. A first set of identification challenges relate to selection effects due to migration and infrastructure. A second, and partly related, set of identification issues concern the assumptions of a) stable unit treatment values (SUTVA), b) parallel trends, and c) no anticipation effects. Moreover, a growing body of literature shows that in "staggered" settings with multiple periods and variation in treatment timing – as is the case in our study – an additional non-standard assumption of d) no heterogeneity in treatment effects across time or units is required (see Roth et al., 2023 for a recent review).[27] We address these challenges and potential sources of bias in several ways.

5.2.1 Migration and infrastructure

Both migration and infrastructure are potentially important transmission channels from SEZs to local labour-market outcomes, as SEZs attract (internal) migrants and cause infrastructure

26 For districts that joined our survey after 2013, we use the baseline value from their first appearance. We estimate the weights using the STATA package "ebalance" with the target parameter set to 1, namely balancing with respect to the first moment (mean). We define districts in Groups I and II as the control group and the districts in Groups III and IV as the treatment group. In section 6.8, we report robustness results using alternative weights (i) from the same binary treatment EB procedure, but adding additional covariates, namely the district-level baseline values of the sectoral employment shares and (log) wages and (ii) from an alternative continuous treatment EB procedure following Tübbicke (2022).

27 Moreover, it has recently been shown that an even "stronger" version of the parallel trends assumption must hold in settings with continuous treatment (Callaway et al., 2021). Further, another implicit assumption is that no other policy was introduced at the time of the treatment – in our context, at the time when an SEZ was established in the district.

development. At the same time, they cause selection and spillover effects: Migrants who move to a SEZ might have had other or better paid jobs even before movement. Those left behind may then, on average, have other and less well paid jobs, causing negative spillovers to migrants' origin locations. Further, SEZs might be planned and put into operation more quickly in places that are better connected to infrastructure.

In the absence of panel data that would follow individual migrant workers over time, we cannot estimate the effect of SEZ-induced movement on the labour-market outcomes of these individuals. Yet, the LFSs do provide data on migration status (more below). We can therefore examine whether there is more (work-related) migration to the exposed district by using a specification like equation (1) with migration status as the outcome of interest. We also estimate equation (1) for a subsample of non-migrants and investigate the effects of SEZs on these "locals." We cannot analyse the impacts of out-migration on the affected places of origin, but we present evidence on upward labour-market mobility associated with migration. In addition, we address selection issues – here the potential negative effects of migration in non-treated districts – by estimating equation (1) on a reduced sample of treated and yet-to-be-treated districts using the estimator proposed by de Chaisemartin and D'Haultfœuille (2022) (hereafter, CH estimator). We discuss this in more detail below.

For infrastructure, we similarly examine its role as a transmission channel and estimate an "impact equation" to assess whether SEZs have caused more infrastructure – proxied by road density – in exposed districts. Further, we introduce road density as an additional regressor in equation (1) to approximate its importance as a transmission channel. Finally, we examine possible selection effects due to initial infrastructure that may have caused SEZs to be built in the first place, or to be built more quickly or bigger. We should note that it is probably impossible to cleanly separate the effects of building infrastructure from those of SEZs, since the establishment of SEZs always involves the construction of infrastructure. Yet, it is still important to rule out non-parallel trends that may in part be due to initial differences in infrastructure. Again, the CH estimator should mitigate such concerns.[28]

5.2.2 *Spillover effects*

In our context, the SUTVA requires that that there should be no (spatial) spillovers from the establishment (or expansion) of SEZs in treated districts to unexposed control districts.[29] Otherwise, unexposed "control" districts that should be unaffected by the establishment of SEZs in "treated" districts would be spuriously treated, biasing our estimates of β_1 and β_2. However, the complete absence of spillovers may be an unrealistic assumption, as it is common for SEZs

28 As a further check, we include initial infrastructure development as an additional balancing covariate in our EB. This does not change our results, which are available on request.

29 Formally, the SUTVA requires that the labour-market outcomes of individuals in district j should not depend on the treatment status of other districts.

in one district to be located close to the borders of other districts.[30] Spillover effects are likely to be ambiguous. For example, positive spillovers are present if individuals in control districts can travel/commute to the treated districts for (better paid) employment opportunities and thus receive treatment. However, they may be negative if individuals in control districts find fewer employment opportunities when firms from control districts relocate to SEZs in treated districts.[31]

Therefore, to account for possible spillovers from SEZs to neighbouring districts, we augment our baseline framework with six additional terms that measure the total built-up area (in 100 ha) of SEZs in *all* neighbouring districts *n* of district *j* at time *t* that are within 0–5, 5–10, 10–15, 15–20, 20–25, and 25–30 kilometres of district *j's* border.[32] For example, spillovers from SEZs in neighbouring districts that are within 0–5 km of the border of district *j* are captured by the following term:

$$\text{SEZ\_spill\_0,5km}_{\text{jt}} = \sum_{n \in N_j \ \ k:D(k,j) \leq 5km}^{N} SEZ\_area_{knt} ,$$

where N_j defines the set of neighbours of district *j*, $D(k, j)$ represents the distance between SEZ *k* and district *j's* border, and SEZ_area_{knt} is the built-up SEZ area of SEZ *k* in district *j's* neighbouring district *n* at time *t*. The extended specification then reads:

$$\text{y}_{\text{ijt}} = \beta_0 + \beta_1 \text{SEZ\_exposure}_{\text{jt}} + \sum_{k=2}^{7} \beta_k \, \text{SEZ\_spill\_5(k} - 2), 5(k - 1)_{\text{ jt}} + \\ + \beta_8 \text{IX}_{\text{ijt}} + \gamma_{\text{t}} + \gamma_{\text{j}} + \varepsilon_{\text{ijt}} \quad (2)$$

While β_1 still measures the effect of SEZs from the same district *j* on the outcomes of individuals in district *j*, β_2-β_7 measure the additional spillover effect of SEZs from neighbouring districts *n* within the respective distance intervals on the outcomes of individuals *i* in district *j*. For ease of interpretation, we omit the interaction between SEZ exposure and the male dummy in this specification.

5.2.3 Parallel trends and anticipation in heterogeneity-robust estimation

The assumption of parallel trends requires that SEZs are not systematically allocated and established in districts whose trends in (labour-market) outcomes would have differed from those of districts without SEZs in the absence of treatment. Furthermore, the assumptions of no anticipation and homogeneous treatment effects require that SEZs have no effects on labour markets prior to their establishment and that the effects do not vary across treated districts or over time. All three assumptions may be violated in our setting because: (i) federal and local

30 To illustrate this, Appendix Figure 4 shows for the southernmost province of Cà Mau that all five of the province's SEZs, indicated by the yellow pins, are located within 10 km of the home district's border with the nearest neighbouring district. Two SEZs, 9696601 and 9696901, are essentially on the border of two districts.

31 Similarly, for already-treated districts, agglomeration/congestion forces may further amplify/attenuate labour-market effects as SEZ spillovers from other treated neighbouring districts increase.

32 Taking spillovers into account in this way results in more districts being treated, and the majority being treated without having an established SEZ themselves: for example, while only 175 districts had established an SEZ in 2013, 383 districts had at least one SEZ within 0–10 km of their border in the same year.

(provincial) policymakers and private developers (sometimes) target specific locations for the establishment of SEZs that may be on development paths different from those of non-targeted locations; (ii) there is often a long time lag between the approval of SEZs and their establishment, making anticipation effects more likely; and (iii) effects are likely to evolve over time and may depend on location-specific characteristics (e.g. differ between rural and urban areas).

To address these identification concerns, we implement the recent CH estimator, which is robust to heterogeneous treatment effects and implements formal tests for parallel trends and anticipation effects. An important caveat in our setting is that, in order to obtain unbiased estimates of average treatment effects on the treated (ATTs) based on "clean" comparisons between newly treated and not-yet-treated units, units that are always-treated (i.e. before the first period in the sample) are dropped from the estimation.[33] As always-treated districts (by 2013) make up the majority of treated districts in our sample (Group IV, Table 1), this drastically reduces the overall size of the treatment group.[34]

To implement the CH estimator, we construct a district-level panel dataset by aggregating our individual-level repeated cross-sectional data at the district level. While the estimator allows for continuous treatment, it assumes that treatment intensity never changes once a group is treated, which is not the case in our context. We therefore convert our continuous treatment measure of SEZ exposure into a binary treatment indicator by using two separate thresholds of built-up SEZ area. First, we use a threshold of 0 ha, so that districts with any built-up area > 0 are treated. Using this threshold results in 19 treated districts and 508 control districts, while the 181 always-treated districts are dropped from the estimation in this case (Group IV, Table 1). Second, we use a threshold of 25 ha, so that districts with a total built-up SEZ area of more than 25 ha are treated. Using this threshold increases our treatment group to 48 districts, with 572 control districts, and 88 always-treated districts that are dropped. For ease of discussion, we call the two corresponding treatment dummy variables *SEZ_presence_0ha* and *SEZ_presence_25ha.*

6 Results

We first distinguish between the impact of SEZs on structural changes in employment and on wages and the quality of employment. We then examine the heterogeneous impact of SEZs with respect to individual skill levels, age, and district type, before looking at some of the transmission channels at work: migration and infrastructure. Finally, we examine spillovers

33 Specifically, to obtain unbiased estimates of ATTs, these estimators use only never-treated or not-yet-treated units as controls, thus avoiding the so-called forbidden comparisons that standard TWFE suffers from. Here, early-treated units are mistakenly used as controls for later-treated units, potentially leading to "negative weighting" in the context of heterogeneous treatment effects and thus bias (Goodman-Bacon, 2021).

34 Extending the analysis into the past (pre-2013), we would still have to drop many districts because we often do not know the exact timing of treatment – namely, when exactly the SEZs were established – due to the lack of regular high-quality Google Earth imagery prior to the 2010s.

and parallel trends and anticipation effects in heterogeneity-robust estimations and conduct additional robustness analyses.

6.1 Structural changes in employment

We first examine the effect of SEZ exposure on the employment status of individuals, where the outcome is a dummy variable that takes the value of either 0 or 1. Column 1 of Table 3 below shows that a 100 ha increase in SEZ built-up area is associated with a 1.6 p.p. increase in the probability of having worked in the last seven days, with no statistically significant difference between men and women. This modest increase in employment (baseline mean: 77/68 per cent for men/women) is accompanied by more dramatic changes in the characteristics of employment (columns 2 and 3 of Table 3). While the expansion of SEZs significantly reduces the share of own-account work and family work (column 2), it increases the share of wage work (column 3).[35] This shift from own-account and family work to wage work is about twice as large for women as for men, with wage work increasing by 2.1 p.p. (or 7 per cent) for women and 1.1 p.p. (or 3 per cent) for men.

Consistent with the shift from own-account and family work to wage work, columns 1–5 of Table 4 below document a clear shift from employment in agricultural and non-agricultural households to foreign firms in SEZ-exposed districts, especially for women. Specifically, an increase of 100 ha in SEZ built-up area reduces women's probability of working in agricultural and non-agricultural household businesses by 1.8 and 2.2 p.p. – equivalent to 4 and 8 per cent, respectively – (columns 1 and 2), and increases their probability to work in foreign firms by 4.5 p.p. – in other words, more than 100 per cent (column 4).[36] For men, the shift in employment from household businesses to foreign firms is again more modest. Employment in private domestic (column 3) and state-owned (column 5) firms is hardly affected by the expansion of SEZs (employment in private domestic firms increases slightly for men).

The changes in employment categories (and employers) reflect sectoral shifts: columns 6–8 of Table 4 show that individuals move from agriculture and services, meaning sectors characterised by (mostly informal) household businesses, to manufacturing, which is dominated by foreign firms. The shift to manufacturing is economically important at 3.7 p.p. (or 29 per cent) for women and 2.3 p.p. (or 20 per cent) for men in a district with an increase of 100 ha of built-up SEZ area. When zooming in, Appendix Table 1 shows that this SEZ-induced increase in manufacturing employment is mainly driven by employment growth in export-oriented manufacturing activities related to clothing (textile, apparel, and leather), electronics, and

35 Zooming in further, we see that women move mainly from family work to wage work, while men move from own-account work to wage work.

36 Not reported here, but consistent with this, individuals are more likely to work in registered businesses in SEZ-exposed districts, almost entirely due to shifts in employment to different types of firms.

plastics in treated districts.[37] These are also the manufacturing sectors that have the highest shares of individuals working in foreign firms. In contrast, employment in domestically oriented manufacturing is either declining, such as food and beverages, or not (statistically significantly) affected by SEZ exposure, such as furniture and wood, metals, and minerals.

Table 3. Impact of SEZ Exposure on Employment Status

	(1) Worked in last 7 days=1	(2) Own-account and unpaid family workers=1	(3) Wage workers=1
SEZ exposure (area in 100 ha)	0.016***	-0.018***	0.021***
	(0.006)	(0.003)	(0.004)
Male=1	0.127***	-0.119***	0.101***
	(0.004)	(0.003)	(0.003)
SEZ exposure X Male=1	-0.003	0.010***	-0.010***
	(0.002)	(0.002)	(0.002)
Constant	0.621***	0.659***	0.332***
	(0.004)	(0.004)	(0.004)
Observations	2,216,128	1,790,060	1,790,060
Baseline mean men	0.771	0.578	0.389
Baseline mean women	0.675	0.684	0.300
R-squared	0.088	0.287	0.278
Year dummies	Yes	Yes	Yes
District dummies	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes

Notes: Column (1) includes all surveyed individuals, while columns (2) and (3) include only individuals in employment. Columns (2) and (3) therefore show shifts in employment between types of workers. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

37 Vietnam's largest export industry, electronics, alone accounted for around 39 per cent of total exports in 2021, up from around 5 per cent in 2010 (ILO, 2022; ITC, 2021).

Table 4. Impact of SEZ Exposure on Type and Sector of Employer

	(1) Agricultural household=1	(2) Non-agricultural household=1	(3) Private firm=1	(4) Foreign firm=1	(5) State firm=1	(6) Agriculture=1	(7) Manufacturing=1	(8) Services=1	(9) Construction=1
SEZ exposure (area in 100 ha)	-0.018***	-0.022***	-0.004	0.045***	0.000	-0.014**	0.037***	-0.020***	-0.002
	(0.005)	(0.005)	(0.004)	(0.006)	(0.002)	(0.007)	(0.005)	(0.006)	(0.002)
Male=1	-0.010**	0.020***	0.013***	-0.024***	0.016***	-0.011**	-0.031***	-0.087***	0.130***
	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)	(0.005)	(0.003)	(0.004)	(0.003)
SEZ exposure X Male=1	0.006***	0.007***	0.007***	-0.020***	-0.001	0.004***	-0.014***	0.009***	0.001
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)
Constant	0.511***	0.356***	0.093***	0.039***	0.005*	0.432***	0.187***	0.326***	0.055***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.002)	(0.006)	(0.004)	(0.005)	(0.002)
Observations	1,788,617	1,788,617	1,788,617	1,788,617	1,788,617	1,790,085	1,790,085	1,790,085	1,790,085
Baseline mean men	0.439	0.321	0.085	0.018	0.037	0.454	0.112	0.319	0.114
Baseline mean women	0.471	0.297	0.065	0.034	0.024	0.471	0.126	0.383	0.019
R-squared	0.338	0.127	0.122	0.184	0.088	0.334	0.156	0.232	0.079
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Only individuals in employment are considered. The table therefore shows shifts in employment between employer and sector categories. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section “A” are classified in Agriculture, those with a code that is part of section “C” in Manufacturing, those with a code that is part of sections “G–U” in Services, and those with a code that is part of sections “B,” “D,” “E,” and “F” in Construction. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Table 5. Impact of SEZ Exposure by Type of Occupation

	(1) Skilled agricultural workers=1	(2) Elementary agricultural workers=1	(3) Machine operator/assemblers=1	(4) Craft workers=1	(5) Professional service workers=1	(6) Sales and personal service workers=1
SEZ exposure (area in 100 ha)	-0.010*	-0.003	0.030***	-0.003	0.001	-0.016**
	(0.006)	(0.004)	(0.005)	(0.006)	(0.001)	(0.006)
Male=1	0.026***	-0.041***	0.038***	0.132***	-0.018***	-0.143***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.001)	(0.005)
SEZ exposure X Male=1	-0.003***	0.008***	-0.017***	0.005***	-0.000	0.008***
	(0.001)	(0.002)	(0.003)	(0.002)	(0.000)	(0.003)
Constant	0.091***	0.339***	0.082***	0.147***	0.006***	0.338***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.001)	(0.006)
Observations	1,790,077	1,790,077	1,790,077	1,790,077	1,790,077	1,790,077
Baseline mean men	0.111	0.337	0.089	0.177	0.115	0.166
Baseline mean women	0.082	0.387	0.053	0.073	0.132	0.272
R-squared	0.179	0.324	0.115	0.102	0.585	0.120
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes Only individuals in employment are considered. The table therefore shows shifts in employment between occupational categories. Occupation classifications follow ISCO-08 codes. Skilled agricultural workers have the code "6," elementary agricultural workers have the code "92," machine operators/assemblers have the codes "8"and "932," craft workers have the codes "7" and "931," professional-service workers have the codes "1–3," and sales and personal service workers have the codes "4" and "52–59." Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Behind these structural effects of the expansion of SEZs on employment categories, sectors, and types of employers are occupational changes that we can investigate in detail with the data at hand. Specifically, we analyse occupations at the (1-digit or 2-digit level) ISCO-08 occupational groups. Consistent with our earlier findings, Table 5 above shows that workers leave skilled agricultural occupations (column 1) and sales and personal-service occupations (column 6) to occupations related to the operation and monitoring of machinery and equipment and the assembly of products (column 3). The shift to industrial occupations is again more pronounced for women, for whom an increase of 100 ha in SEZ area increases the share of female machine operators and assemblers by 3 p.p. (about 44 per cent). Employment in craft (column 4) and professional-service (column 5) occupations – we group managerial, technical, and professional services together – is not statistically significantly affected for women and only marginally so for men.

6.2 Wages and the quality of employment

We distinguish between monthly (log) wages for wage workers and monthly (log) income for own-account workers as our primary indicators of the earning of working individuals. Column 1 of Table 6 below shows that an increase of 100 ha in a district's built-up SEZ area is associated with a 6.2 and 4.8 per cent increase in average district wages for female and male wage workers, respectively, without controlling for sector or occupation fixed effects. When we introduce 4-digit ISIC or 4-digit ISIC sector fixed effects, the coefficient falls by 1.2 p.p., from 6.2 to 5 per cent in column 3 for women.[38] This suggests that most of the overall wage growth in treated districts is due to wage growth within subsectors and occupations in SEZ-exposed districts, as opposed to the shifts in employment across subsectors and occupations. While the same pattern holds for (log) own-account income, the effects are not statistically significant. Appendix Table 2 confirms the results when (log) hourly wages are considered.

38 Including these additional fixed effects, the coefficient on SEZ exposure is identified by comparing changes in wages for workers with the same observable characteristics within the same subsector and the same occupation (columns 2 and 4), some of whom worked in districts that experienced large SEZ expansion and others who worked in districts with smaller (or no) SEZ expansion.

Table 6. Impact of SEZ Exposure on (Log) Wages and Own-Account Income

	(1) Log wage	(2) Log wage	(3) Log own-account income	(4) Log own-account income
SEZ exposure (area in 100 ha)	0.062***	0.050***	0.045	0.026
	(0.011)	(0.011)	(0.035)	(0.030)
Male=1	0.191***	0.120***	0.333***	0.363***
	(0.005)	(0.003)	(0.011)	(0.009)
SEZ exposure X Male=1	-0.014***	-0.004***	-0.013*	-0.007
	(0.002)	(0.001)	(0.007)	(0.004)
Constant	8.082***	8.217***	7.846***	7.855***
	(0.011)	(0.009)	(0.018)	(0.015)
Observations	715,141	714,941	478,927	478,820
Baseline mean men	8.16	8.16	7.91	7.91
Baseline mean women	8.03	8.03	7.57	7.57
R-squared	0.363	0.496	0.368	0.555
Year dummies	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Sector dummies	No	Yes	No	Yes
Occupation dummies	No	Yes	No	Yes

Notes: Columns (1) and (2) include only wage workers, while columns (3) and (4) include only own-account workers. Income data for own-account workers are only available from 2015 onwards. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

We now use our detailed data to examine who benefits from wage growth in treated districts. Two important results emerge. First, not only do workers in foreign firms in SEZ-exposed districts experience wage increases but so do workers employed in various types of domestic firms. While workers in foreign firms experience a wage increase of 3.9 per cent, workers in all types of domestic household businesses and firms experience wage increases ranging from 1.6 to 5.5 per cent (columns 1–5, Table 7 below). Second, wage increases are not confined to manufacturing but also occur in the other main sectors. While wage growth in services and construction is lower than in manufacturing, it is even higher in agriculture (columns 6–9, Table 7). Appendix Table 3 further confirms the broad SEZ-induced wage growth across occupational groups, including machine operators and assemblers, craft workers, professional, sales, and personal-service workers, and elementary and skilled agricultural workers.

Table 7. Impact of SEZ Exposure on Wages by Type of Employer

	(1) Agricultural households	(2) Non-agricultural households	(3) Private firms	(4) Foreign firms	(5) State firms	(6) Agriculture	(7) Manufacturing	(8) Services	(9) Construction
SEZ exposure (area in 100 ha)	0.039**	0.016*	0.033**	0.039***	0.055***	0.073***	0.047***	0.026***	0.035***
	(0.020)	(0.008)	(0.014)	(0.012)	(0.019)	(0.025)	(0.013)	(0.008)	(0.010)
Male=1	0.348***	0.337***	0.175***	0.106***	0.160***	0.273***	0.156***	0.183***	0.213***
	(0.013)	(0.006)	(0.004)	(0.008)	(0.012)	(0.016)	(0.006)	(0.004)	(0.006)
SEZ exposure X Male=1	-0.011	0.002	-0.004**	-0.005***	-0.004	-0.038***	-0.012***	0.008**	-0.000
	(0.007)	(0.004)	(0.002)	(0.002)	(0.005)	(0.008)	(0.002)	(0.004)	(0.003)
Constant	7.824***	7.982***	8.252***	8.397***	8.158***	7.844***	8.196***	7.992***	8.131***
	(0.012)	(0.007)	(0.013)	(0.033)	(0.025)	(0.013)	(0.020)	(0.008)	(0.010)
Observations	86,444	172,595	171,712	64,931	45,653	67,463	191,122	332,233	124,226
Baseline mean men	7.78	8.03	8.24	8.21	8.4	7.88	8.13	8.25	8.14
Baseline mean women	7.5	7.65	8.06	8.08	8.26	7.61	7.92	8.15	8.04
R-squared	0.382	0.373	0.432	0.533	0.426	0.398	0.454	0.347	0.441
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services, and those with a code that is part of sections "B," "D," "E," and "F" in Construction. Standard errors are reported in parentheses, clustered at district level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Beyond wages, Table 8 below shows that the expansion of SEZs improves other indicators of employment in treated districts. The first three columns show that in districts with a 100 ha increase in built-up SEZ area, there is a 3.7 p.p. increase in wage workers[39] with permanent labour contracts for women (2.9 p.p. for men) and a roughly equal decrease in wage workers without written labour contracts. This corresponds to an increase of about 7 per cent in the number of wage workers with permanent labour contracts. The impact on the social security contributions is even stronger, with the share of women contributing increasing by 4 p.p. (2.4 p.p. for men), or about 20 per cent (13 per cent for men) in SEZ-exposed districts (column 4).[40]

Table 8. Impact of SEZ Exposure on Type of Labour Contract and Social Insurance Contributions

	(1) Permanent contract=1	(2) Short-term contract=1	(3) No written contract=1	(4) Social insurance=1
SEZ exposure (area in 100 ha)	0.037***	-0.006	-0.031***	0.040***
	(0.010)	(0.008)	(0.004)	(0.006)
Male=1	-0.047***	-0.070***	0.117***	-0.029***
	(0.003)	(0.005)	(0.006)	(0.003)
SEZ exposure X Male=1	-0.009***	-0.001	0.010***	-0.015***
	(0.002)	(0.003)	(0.003)	(0.003)
Constant	0.104***	0.237***	0.659***	0.092***
	(0.009)	(0.008)	(0.009)	(0.005)
Observations	717,118	717,118	717,118	1,787,722
Baseline mean men	0.403	0.150	0.447	0.185
Baseline mean women	0.525	0.206	0.269	0.196
R-squared	0.386	0.156	0.389	0.391
Year dummies	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes

Notes: Columns (1) to (3) only consider wage workers. The estimated effects therefore only reflect changes in contractual arrangements among wage workers and not shifts between types of workers – for example, from own-account and family work to wage work. Social insurance (column 4) in Vietnam covers employee benefits such as sick leave, maternity leave, compensation for accidents at work and occupational hazards, and pension benefits. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

39 We consider only wage workers, as information on labour contracts is not consistently collected for the other types of workers. In any case, unpaid family workers and own-account workers generally do not have written labour contracts. For example, 99.5 per cent of unpaid family workers did not have a written labour contract in the two years (2013 and 2014) during which this data was collected.

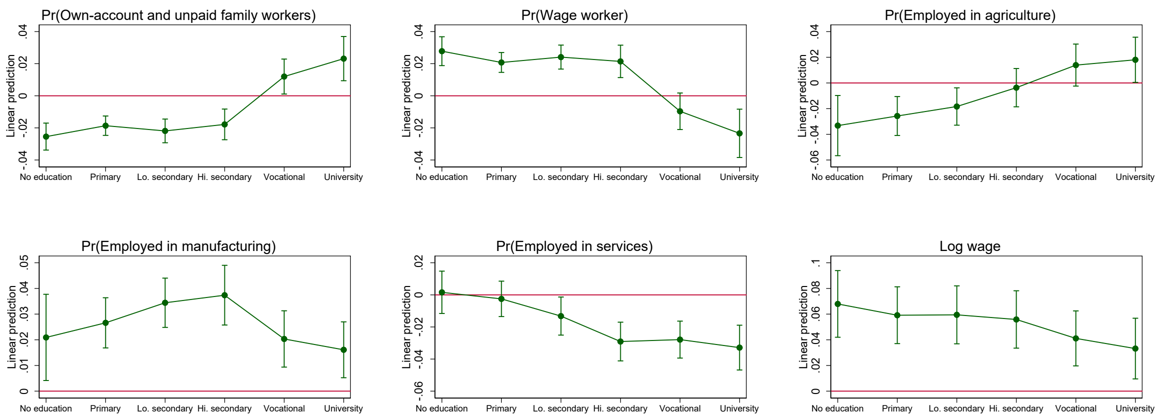
40 While the increase in permanent contracts is mainly due to increases within sectors and occupations, the increase in social insurance contributions is almost entirely due to structural shifts in employment between sectors and occupations, as shown by the addition of fixed effects for 4-digit ISIC subsectors and 4-digit ISCO occupations.

6.3 Heterogeneous impacts

Individuals with different levels of education and at different ages tend to work in different sectors and occupations. As the impacts of SEZs vary across sectors and occupations, they are also likely to vary across individuals. In addition, individuals living in rural and urban districts may be affected differently due to the very different economic and employment structures. To capture the differential impacts by education, age, and district type we run three separate sets of regressions, including interaction terms between our SEZ exposure variable and categorical variables for different education and age groups, as well as a rural-district dummy.

Figure 4 below shows striking differences and sometimes even opposite effects of SEZs for individuals with different levels of education across a range of outcomes. While individuals with low to medium levels of education (primary-higher secondary), move from own-account and unpaid family work to wage work in treated districts, the opposite is true for highly educated individuals (vocational and university). Similarly, the related movement out of agriculture in treated districts is mainly driven by less educated individuals. Some individuals with higher levels of education even move into agriculture; but, more importantly, they leave the service sector – in particular, sales and personal-service occupations (Appendix Table 4) – for manufacturing. All education groups move into manufacturing, but the shift is strongest for those with medium educational attainment.[41] Wage growth is the strongest for individuals with no education, at almost 7 per cent, and declines as education increases, with university graduates gaining only about 3 per cent in districts with a 100 ha increase in built-up SEZ area.

Figure 4. Impact of SEZ Exposure (100 ha Increase in Built-Up SEZ Area) by Education

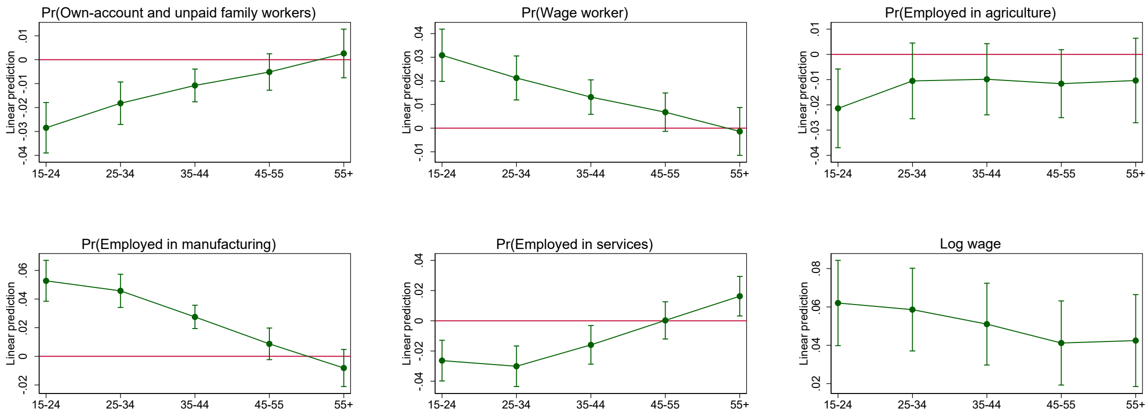


Notes: Only individuals in employment are considered in all panels. In the bottom right-hand panel, only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services.

41 Accordingly, individuals with medium educational attainment experience the strongest employment growth in foreign firms and in machine operators/assemblers (Appendix Table 4).

Figure 5 below shows that the documented pattern of structural change in treated districts from own-account to wage work and from employment in agriculture and services to manufacturing, as well as wage growth, is strongest for the youngest age cohort (15–24 years old) and weakens with increasing age. In fact, the oldest cohort (55+ years old) is essentially unaffected by the expansion of SEZs, except for slightly higher wages. Interestingly, but perhaps unsurprisingly, the movement into (foreign) manufacturing is the strongest for the youngest age cohort, which is also the cohort with by far the largest share of individuals with lower and higher secondary education, consistent with Figure 4.

Figure 5. Impact of SEZ Exposure (100 ha Increase in Built-Up SEZ Area) by Age



Notes: Only individuals in employment are considered in all panels. In the bottom right-hand panel, only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G-U" in Services.

Finally, looking at differential impacts by district type, it should first be noted that of all the 608 operational and planned SEZs, 415 (68 per cent) are located in rural districts and 193 (32 per cent) in urban districts. However, only about 35 per cent of all rural districts have an SEZ, compared to 53 per cent of all urban districts. Appendix Table 9 shows that the documented shift from own-account and unpaid family work to wage work is mainly driven by the effect on rural districts (columns 1 and 2). For the remaining outcomes, there are no significant differences in the impact between rural and urban districts.

6.4 Migration

Internal migration, particularly from rural to urban areas, has steadily increased in the course of Vietnam's strong economic growth over the past two decades (Liu and Meng, 2019; Vo, 2021). Qualitative and quantitative evidence suggests that employment opportunities offered by foreign firms (often located in SEZs) are an important factor in attracting internal migrants to urban and peri-urban areas (Fukase, 2013; Liu and Meng, 2019). The LFSs have information on how long individuals in our sample have lived in their current ward, town, or commune –

Vietnam's third administrative level – and, if they have moved within the last five years, from where (from which province) and why (See Appendix Table 5). About 6 per cent of Vietnam's population had lived in their current ward, town, or commune for less than five years, and two-thirds of these migrants had moved within the same province – Vietnam's first administrative level.[42] Of all migrants, about half cited family and marriage and a fifth cited work as their main motivation for migrating.[43]

Table 9. SEZ Exposure and Length of Residence in Ward, Town, Commune

	(1)	(2)
	Migrant with less than 1 year of residence=1	Migrant with 1 to 5 years of residence=1
SEZ exposure (area in 100 ha)	0.002	0.013**
	(0.003)	(0.006)
Male=1	-0.006***	-0.026***
	(0.000)	(0.001)
SEZ exposure X Male=1	0.001***	0.001**
	(0.000)	(0.001)
Constant	0.019***	0.045***
	(0.002)	(0.004)
Observations	1,616,012	1,616,012
Baseline mean men	0.016	0.035
Baseline mean women	0.022	0.063
R-squared	0.030	0.066
Year dummies	Yes	Yes
District dummies	Yes	Yes
Individual controls	Yes	Yes

Notes: The regressions only include data from 2015 onwards, as the duration of residence in the current ward, town, commune is not available at the same level of detail for earlier years. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Using these data, we examine the impact of SEZ exposure on the incidence of migration (at the third administrative level), distinguishing between the effect of SEZ exposure on the share of migrants who arrived at their current residence within the last year and those who arrived between one to five years ago. Table 9 below shows that there is no significant effect on the share of migrants who arrived less than one year ago (column 1), but that the share of migrants who have arrived between one and five years ago increases by 1.3 p.p. for men (1.4 p.p. for women, significant at the 5 per cent level) for a 100 ha increase in built-up area. This increase

42 There is no information on how much migration takes place within the same district – Vietnam's second administrative level.

43 Work-related in-migration is more likely to be from another province: about two-thirds of migrants who had migrated for work came from another province, compared to only one-third of the total migrant population.

is considerable given baseline shares of 3.5 per cent (men) and 6.3 per cent (women), respectively.[44]

A comparison of migrants with long-term residents (hereafter, just residents), who have lived in their current location for five or more years, as shown in Appendix Table 7, reveals significant differences in terms of employment. While the vast majority of migrants are wage workers, the majority of residents are own-account and family workers. Accordingly, migrants are most likely to work in services and manufacturing, while residents are most likely to work in agriculture. In fact, migrants are particularly over-represented in manufacturing and especially in foreign firms, accounting for around 10 and 17 per cent of all workers in manufacturing and foreign affiliates respectively, although they represent only around 5 per cent of the working-age population (Appendix Table 8).

Having established that there is a significant increase in (work-related) migration in the treated districts compared to the control districts and that migrants account for a significant share in manufacturing and foreign firms, we now examine whether the documented patterns of the labour-market effects still hold when we look only at residents – that is, exclude migrants from the analysis. Table 10 below shows that the increase in wage employment in the manufacturing sector in exposed districts still holds when only residents are considered. However, it is only accompanied by a decline in services, while the effects on any employment in the last seven days, employment in agriculture, and own-account and unpaid family work are no longer statistically significant. Moreover, these shifts are more modest, at around half the size – as is the average (significant) impact on wages, too.

Yet, Appendix Figure 3 shows that, when broken down by educational attainment, the effects are similar to the results based on the full sample in Figure 4 above: long-term residents with low to medium levels of education tend to move out of agriculture and into manufacturing wage work (modest effects), while their wages increase substantially. For better-educated "locals" with vocational training or a university degree, the wage effects are nil and they even tend to move out of wage- into self-employment in the service sector.

44 Appendix Table 6 shows that this effect is driven by work-related in-migration. There is a positive and highly significant impact of SEZ exposure on the share of work-related migration (column 1), while there is no significant effect on the share of family- or education-related migration (columns 2 and 3).

Table 10. SEZ Impact on Residents

	(1) Worked in last 7 days=1	(2) Own-account and unpaid family workers=1	(3) Wage workers=1	(4) Agriculture=1	(5) Manufacturing=1	(6) Services=1	(7) Log wage
SEZ exposure (area in 100 ha)	-0.002	-0.006	0.010**	-0.006	0.023***	-0.015***	0.029***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)
Male=1	0.139***	-0.127***	0.109***	-0.015***	-0.037***	-0.085***	0.190***
	(0.004)	(0.003)	(0.003)	(0.005)	(0.003)	(0.004)	(0.005)
SEZ exposure X Male=1	-0.005**	0.010***	-0.011***	0.005***	-0.013***	0.009***	-0.015***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Constant	0.610***	0.635***	0.355***	0.417***	0.201***	0.322***	8.188***
	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.005)	(0.007)
Observations	1,525,346	1,233,094	1,233,094	1,233,135	1,233,135	1,233,135	500,415
Baseline mean men	0.771	0.578	0.389	0.454	0.112	0.319	0.319
Baseline mean women	0.675	0.684	0.300	0.471	0.126	0.383	0.383
R-squared	0.089	0.275	0.266	0.323	0.147	0.230	0.323
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Residents are defined as those individuals who have lived in their current location for five or more years. In columns (2) to (6) only employed residents and in column (7) only resident wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section “A” are classified in Agriculture, those with a code that is part of section “C” in Manufacturing, those with a code that is part of “G–U” in Services, and those with a code that is part of “B,” “D,” “E,” and “F” in Construction. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

The results remain unchanged if we exclude only the group of migrants who had moved from another province to their current districts, cities, communities, but include – as residents – those who had migrated but remained in the same province.[45] Thus, migration from other provinces accounts for about half of the previously documented SEZ-induced increase in manufacturing employment and wages. Since in-migration from other provinces is much more likely to be work-related, it makes sense that this type of migration would account for some of our estimated effects.[46]

In summary, these results suggest that migration is an important mechanism behind the SEZ-induced sectoral and occupational changes occurring in Vietnam. Unfortunately, we cannot explore this further because we lack precise information on these migrants' previous occupations in their places of origin. In principle, migrants could have had the same job before moving to a district with an SEZ, which means that our analysis may confound the movement of selected individuals with structural change. In this case, the observed changes in treated districts – due to in-migration – would be mirrored and probably be offset by opposite effects – due to out-migration – in non-treated districts.

While we cannot rule out the possibility of such effects with certainty, two pieces of evidence suggest that they are unlikely in our context. First, LFS data on the provinces of origin of migrants who moved for work-related reasons show that these migrants disproportionately come from less developed and more rural provinces that are dominated by agriculture. Second, previous evidence from Coxhead et al. (2015) shows that migrants often transition from unskilled work or no work to semi-skilled occupations in "the fast-growing urban-industrial economy". Indeed, two-thirds of new semiskilled workers in their migrant sample come from either unskilled work or no work.

6.5 Infrastructure

To investigate the effects of SEZs on infrastructure (and vice versa) we rely on a road density proxy. We calculate this proxy based on the total number of roads that are within a 1,500-metre radius of each of the 608 operational and planned SEZs using road-network data from OSM. We then aggregate this road density around SEZs for each district. This is done separately for each year in our sample between 2013 and 2019.[47] Appendix Table 10 shows that, in 2013, road

45 Note again that migration is measured at Vietnam's third administrative level as we do not have information on migration at the district level. Results that include migrants from the same province and exclude migrants from other provinces are available upon request.

46 About two-thirds of migrants who had migrated for work came from another province, compared to only one-third of the total migrant population.

47 We access the OSM road-network data through the Overpass API. In terms of road type, we count the number of motorways, primary, secondary, and tertiary roads within a 1,500-metre radius of each SEZ. We focus only on road density within a 1,500-metre radius of planned or existing SEZs, rather than at the district level, as OSM does not allow for the retrieval of such large datasets. In practice, we generate the road density time series for

density was roughly the same in never-exposed Group II districts that are planning an SEZ and in Group III districts exposed to the first SEZ after 2013, but increased much more in the latter districts by 2019. The increase in road density was also much higher for always-exposed Group IV districts, which already had higher levels thereof in 2013.

Note that the lack of counterfactual road density in districts without SEZs implies that we work with the reduced sample of districts with planned or operational SEZs (Groups II–IV districts in Table 1 above). In this sample, we now regress the SEZ exposure on (contemporary) road density and find a strong effect of 6.24 p.p. in Appendix Table 11. This means that an additional 100 ha of SEZ built-up area in a district is associated with 6.24 more roads within 1,500 metres of SEZs in that district.

As expected, infrastructure thus expands much quicker close to SEZs. It is difficult to precisely estimate how important this component of SEZ policy is, but for some indicative insight we introduce contemporary infrastructure in our baseline regression specification (Appendix Table 12). It turns out that the coefficient on SEZ exposure (and its interaction) remains essentially unchanged and that the coefficient on road density is very small (and often not significantly different from 0). We cautiously take this as suggestive evidence that it is the "SEZ package" that drives the results and not the associated changes in infrastructure alone.

6.6 Spillovers

We now examine spillover effects on individuals living in neighbouring districts. As discussed in section 5.2, the existence of such spillovers would bias the treatment effects in our DiD design. As such, we add six additional terms that measure the total built-up area (in 100 ha) of SEZs in neighbouring districts n of district j at time t that are within 0–5, 5–10, 10–15, 15–20, 20–25, and 25–30 km of the border of district j. As discussed above, spillovers from SEZs in treated districts could affect the labour-market outcomes of individuals living in nearby[48] control districts, either positively or negatively.

Table 11 below shows that spillovers to neighbouring districts are not a major identification concern in our context, as they are generally statistically insignificant or economically small. Thus, the structural shifts in employment and improvements in employment quality indicated by the main effects are not at the expense of individuals in neighbouring control districts. When spillovers are present, on the contrary, they tend to have the same sign as the main "direct" effect, reinforcing the general patterns (see, for example, columns 7 and 9).

---

each of the 608 planned and established SEZs by counting the number of highway keys with the value motorway, primary, secondary, or tertiary within a 1,500-metre radius separately for each SEZ and year using the Overpass API. Crucially, this approach assumes that the new features that are added from year to year are truly new roads that have been built and not just an improvement in coverage.

48 Here, we analyse potential spillovers to neighbouring districts only. We discuss spillovers over longer distances due to migration above.

Table 11. SEZ Exposure and Spillover Effects from SEZs in Neighbouring Districts

	(1) Own-account and unpaid family workers=1	(2) Wage worker=1	(3) Agricultural household=1	(4) Non-agricultural household=1	(5) Private firm=1	(6) Foreign firm=1	(7) Agriculture=1	(8) Manufacturing=1	(9) Services=1	(10) Log wage
SEZ exposure (area in 100 ha)	-0.021***	0.021***	-0.016*	-0.015**	0.001	0.028***	-0.023**	0.029***	-0.007	0.041***
	(0.006)	(0.005)	(0.009)	(0.006)	(0.005)	(0.005)	(0.010)	(0.005)	(0.008)	(0.010)
SEZ-spillover 0-5 km	0.000	-0.000	-0.002	-0.001	-0.003	0.006	0.004	0.004	-0.007**	0.002
	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
SEZ-spillover 5-10 km	-0.004	0.005	-0.007	0.006	0.001	0.005	-0.009**	0.004	0.006**	0.009*
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.005)
SEZ-spillover 10-15 km	0.004	-0.004	-0.001	-0.000	0.001	-0.004	-0.000	-0.001	0.004	-0.002
	(0.003)	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.005)
SEZ-spillover 15-20 km	0.004	-0.004	0.001	-0.000	-0.004	0.003	0.001	-0.001	-0.000	0.009**
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
SEZ-spillover 20-25 km	0.000	0.001	-0.001	-0.001	0.007***	-0.003	0.000	-0.002	0.002	-0.006
	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
SEZ-spillover 25-30 km	0.002	-0.002	0.006**	-0.002	-0.001	-0.000	0.008***	-0.004*	-0.004**	0.007*
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Constant	0.647***	0.343***	0.510***	0.353***	0.085***	0.044***	0.424***	0.199***	0.320***	8.054***
	(0.007)	(0.007)	(0.009)	(0.007)	(0.006)	(0.005)	(0.007)	(0.007)	(0.005)	(0.012)
Observations	1,790,060	1,790,060	1,788,617	1,788,617	1,788,617	1,788,617	1,790,085	1,790,085	1,790,085	715,141
Baseline mean men	0.578	0.389	0.439	0.321	0.085	0.018	0.454	0.112	0.319	8.16
Baseline mean women	0.684	0.300	0.471	0.297	0.065	0.034	0.471	0.126	0.383	8.03
R-squared	0.286	0.278	0.337	0.126	0.122	0.180	0.333	0.155	0.231	0.363
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Only individuals in employment are considered. In column (10), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services, and those with a code that is part of sections "B," "D," "E," and "F" in Construction. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

6.7 Parallel trends and anticipation effects in heterogeneity-robust estimation

We now examine parallel trends and anticipation effects, and account for heterogeneous treatment effects by implementing the CH estimator on a district-year panel with a binary treatment. As explained in section 5.2, we use the two dummy variables *SEZ_presence_0ha* (built-up SEZ area > 0 ha) and *SEZ_presence_25ha* (built-up SEZ area > 25 ha). Note again that the always-treated districts are dropped by the CH estimator to prevent forbidden comparisons, resulting in 19 treated districts in the estimation using a threshold of 0 ha and 48 treated districts using a threshold of 25 ha.[49]

Figure 6 below shows the impact of SEZ presence on the main outcome variables in two sets of event-study plots using the CH estimator and the two separate treatment indicators *SEZ_presence_0ha* and *SEZ_presence_25ha.* The y-axis represents the estimated effect in p.p./100 and the x-axis represents the relative time to treatment. Treatment is 1 at year t=0, so three years before treatment (t-3) and three years after treatment (t+3) are considered. Several things stand out from the two sets of plots.

First, for all outcomes except the probability of being employed in services, there is a discontinuity at the time of treatment at t=0 for the coefficient on the *SEZ_presence_0ha* indicator (left panel). This suggests that in the same year that SEZs first open their factories they already have an effect on the structure of local employment. No similar discontinuity is observed at t=0 for the *SEZ_presence_25ha* indicator (left panel), which makes sense since, by definition, treated districts in fact already had some factories in t-1.

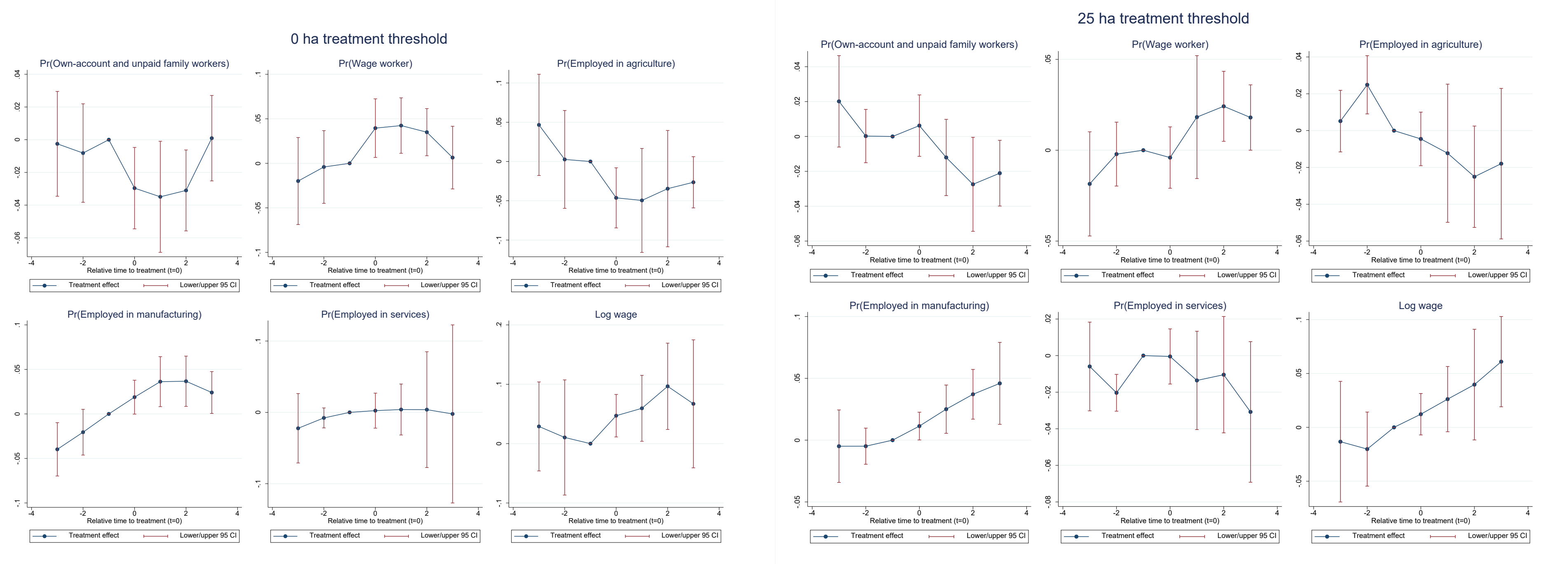
Second, the sign and size of the estimated effects are consistent with our previous findings, and the dynamics suggest that the effect size increases over time. However, the coefficient estimates are not always statistically significant; in particular, several years before or after treatment the coefficient estimates have large standard errors due to increasingly small sample sizes, so we would also not over-interpret the dip we see for some outcomes in t-3.

Third, in general there do not seem to be any clear anticipation effects or pre-trends that are consistent across both treatment dummies. In fact, with very few exceptions (the probability of being employed in manufacturing in t-3 for *SEZ_presence_0ha* and the probability of being employed in agriculture in t-2 for *SEZ_presence_25ha*), the pre-treatment coefficients are not statistically different from 0.

Taken together, we interpret the heterogeneity-robust estimation results as confirming the baseline findings. The structural changes in employment and the improvements in earnings and working conditions are thus very likely to be driven by exposure to SEZs and not by some omitted or unobserved factors.

49 We implement the CH estimator in STATA using the "did_multiplegt" package. Standard errors are estimated using 100 bootstrap replications and clustered at the district level. Controls are included for the average age of individuals, the proportion of males, and the proportion of individuals with different levels of education in a given district.

Figure 6. Impact of SEZ Presence Using Heterogeneity-Robust CH Estimator



Notes: The heterogeneity-robust CH estimator on the district-year panel is used to construct all plots. Plots in the left/right panel use a binary treatment indicator that takes the value of 1 if the total built-up SEZ area in a district in a given year is greater than 0/25 ha, and 0 otherwise. Based on these thresholds, the left/right panel plots use 572/508 never-treated control districts and 48/19 districts that are treated after 2013, while 181/88 always-treated districts are dropped from the estimation. Only individuals in employment are considered in all panels. In the bottom right-hand panel, only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services.

6.8 Robustness checks

We now perform several robustness checks to validate our results. To keep these checks manageable and for reasons of space, we focus on four main outcomes. Namely, the employment shares in agriculture, manufacturing, and services as well as (log) wages.

6.8.1 Alternative weights

To verify that our estimated effects are not sensitive to the choice of covariates for calculating the EB weights, we re-estimate our baseline specification, adding the baseline values of the sectoral employment shares and (log) wages to the original covariates.[50] We also use an alternative EB procedure that estimates weights for the continuous treatment case (Tübbicke, 2022). This uses both the baseline and the extended set of covariates.[51]

Appendix Table 13 presents four sets of results: (1) our baseline specification with EB weights based on *binary treatment* and the original covariates plus specifications; (2) with EB weights based on binary treatment and an extended set of covariates; (3) with EB weights based on *continuous treatment* and the original covariates; and (4) with the extended set of covariates. Extending the list of covariates in the original specification has little effect on the results (HM and HR columns). For the specifications using weights from EB with continuous treatment, we generally see the same patterns, but with some variations (TM and TR columns). Both specifications show an increase in employment in manufacturing, while employment in agriculture remains unaffected, and the decline in services is only statistically significant for the specification with the extended set of covariates. Moreover, in both specifications we see wage increases of the same order of magnitude as in our specifications using EB weights with binary treatment. These differences are not easy to rationalise, but despite these variations our interpretation of this robustness exercise is that it leaves our main results intact.

6.8.2 Alternative samples

We also re-estimate equation (1) using two restricted samples based on the different district exposure groups in Table 1 above in order to have more similar control and treatment districts and thus reduce concerns about non-parallel trends. First, we leave only the 88 untreated Group II districts in the control group that are planning an SEZ and compare them with only the 19 Group III districts that are treated after 2013. Second, we use only the 200 always-treated Group IV districts that became more exposed over time. From both samples, we therefore exclude the 420 never-treated Group I districts that are not planning SEZs either.

---

50 These were the district-level baseline values for the average age of individuals, the proportion of individuals with different levels of education, and the type of district (rural/urban).

51 We estimate EB weights for continuous treatment using the STATA "ebct" package introduced in Tübbicke (2022).

Appendix Table 14 shows the regression results for these different samples, together with our main results that are based on the full sample including Groups I–IV. In all samples, the general pattern of a shift in employment from services to manufacturing and an increase in wages in treated districts holds. However, while employment in agriculture falls in the full sample, this is result does not hold when we compare Group II (control, not-yet treated) and treated Group III districts only. In this sample, SEZ expansion even increases agricultural employment for men. In fact, the decline (also for men) in the full sample comes from (always-treated) Group IV districts. Deeper analysis of the role of agriculture goes beyond the scope of this paper, but quite a few of our results – for example, the movement of higher-skilled individuals into this sector – indicate that Vietnamese agriculture is not simply a supplier of "surplus labour" to manufacturing.

6.8.3 Alternative measures of SEZ exposure

We first check whether our results are sensitive to the imputation of missing values for the built-up SEZ area in the gap years. Appendix Table 15 shows that the results are robust to leaving the values for the gap years as missing instead of interpolating them linearly. However, the estimated coefficients are somewhat smaller for all outcomes and not statistically significantly different from 0 for employment in agriculture (column 3). The insignificant overall effect on agricultural employment in this reduced sample conceals statistically significant heterogeneous impacts – as individuals with lower levels of education leave agriculture, while individuals with higher levels of education enter agriculture (not reported, but available on request).

Second, to relax our assumptions on functional form – here, the (log-)linear relationship between SEZ size and respective outcomes – we transform our continuous SEZ exposure variable into a categorical variable. We create nine dummy variables for each 25-ha increment, ranging from 0 to 200 ha, with the last dummy capturing all SEZs larger than 200 ha. Appendix Figure 5 shows how the impact of SEZs on key labour-market outcomes increases with the built-up area of SEZs. It is striking how much the impact varies with the size of SEZs. This illustrates that there is much to be learnt from using actual size. For example, the share manufacturing employment rises by 15 p.p. in districts with an increase in built-up SEZ area of more than 200 ha, compared to only 2.6 p.p. in districts with an increase of 1–25 ha. Similarly, the impact on wages becomes significant and economically relevant only in districts with larger increases in SEZ exposure, increasing by about 25 per cent in districts with a built-up SEZ area of more than 200 ha. Interestingly, the magnitude of the coefficients increases almost linearly with the size of SEZs, suggesting that the labour-market impact of further SEZ expansion diminishes only slowly.[52]

52 This is also confirmed when we add another squared term for SEZ exposure in the baseline specification. The coefficient on this variable is negative but small compared to the standard SEZ effect, suggesting a slowly diminishing effect on labour-market outcomes as the total built-up SEZ area in districts increases (results available upon request).

7 Conclusion

Vietnam has made great strides in integrating into GVCs over the past three decades. There is a consensus that this integration has been a key factor in the country's extraordinary economic performance. The establishment of SEZs has been a cornerstone of the policies aimed at increasing Vietnam's participation in global trade and investment, with over 300 SEZs established to date many more in the pipeline.

In this paper, we show that the establishment of SEZs has been instrumental in shifting employment from own-account and family work in agriculture and services to (export-oriented) wage work in manufacturing. The structural changes in employment that we can attribute to SEZ exposure are substantial: the estimated 3.7 p.p. increase in manufacturing employment in a district with a 100 ha expansion of built-up SEZ area – roughly equivalent to the average built-up SEZ area in treated districts – is close to the 5 p.p. increase in formal manufacturing that McCaig and Pavcnik (2018) find due to the conclusion of Vietnam's BTA with the US. In line with the shift in employment from household businesses to foreign firms, we document shifts from agricultural and sales and personal-service occupations to medium-skilled manufacturing occupations, especially those related to the operation and monitoring of machinery and equipment and the assembly of products.

In terms of the quality of employment, we find that the expansion of SEZs leads to higher wages and more formal employment in the treated districts. Wage rises are mainly driven by increases within occupations and sectors rather than by changes between occupations and sectors. Moreover, wage increases are not limited to workers in foreign firms in manufacturing but also benefit both high- and low-skilled workers in domestic firms in agriculture and services. Beyond wages, individuals in treated districts are more likely to have permanent employment contracts and to be covered by social security as SEZs expand.

Our heterogeneity analysis reveals striking differences between different groups of individuals. The patterns of change have been "inclusive": women and younger individuals with low and medium levels of education have benefited disproportionately from SEZ-induced higher wages and more stable employment in industrial occupations. Yet, wage differentials between men and women persist. Further, not all have benefitted equally from SEZ expansion. While export-oriented manufacturing in foreign firms has expanded, domestically oriented manufacturing in non-agricultural household businesses and domestic firms has stagnated or even contracted. This has affected older, more educated individuals who have not benefited to the same extent from the documented structural changes in labour markets.

We also analyse adjustment mechanisms: Our analysis suggests that migration is an important mechanism of labour re-allocation, but we still see important effects of SEZ exposure on employment and wages when looking only at the long-term resident population. Moreover, SEZs are associated with infrastructure expansion, but we provide suggestive evidence that this is an important transmission channel of these zones to labour markets. Finally, we show that there are no negative spatial spillovers to the labour markets of untreated neighbouring districts without SEZs.

These findings fill an important gap in our understanding of the effects of SEZs. Despite the scale of Vietnam's SEZ programme, its impact on labour markets had previously not been rigorously studied. We have filled this gap by combining satellite imagery of SEZs and their expansion over time with nationally representative LFSs. By using the actual built-up SEZ area at the district-year level, we are, to the best of our knowledge, the first to use a continuous treatment measure of SEZ exposure. Our main specification is a continuous treatment DiD design over a seven-year period (2013–2019), using EB weights to improve the comparability of the treatment and control districts. Our main results also hold when using heterogeneity-robust estimators: we find no evidence of anticipation effects and show that the results are not driven by non-parallel trends. Additional analyses using alternative weights, different (sub)samples, and measures of SEZ exposure also leave our main findings intact.

What can be learnt, then, from Vietnam's experience with SEZs? Our findings do not imply that SEZ programmes are a panacea for accelerating economic development. The success of Vietnam's SEZ programme has to be seen in the context of a number of complementary institutional reforms and policies. These include: (a) the creation of a conducive investment climate, facilitated by an open trade and investment regime and complemented by domestic economic reforms (for example, the reform of enterprise laws); (b) decentralisation and administrative capacity (and commitment) at various levels of government, especially at the provincial level; and (c) an education system capable of equipping workers with the skills needed in the country's growing manufacturing sectors.

We share the view, recently put forward by Dercon (2022), that all these reforms and policies – including SEZs – are part of Vietnam's specific "development bargain." That is, the commitment of the country's elites to growth and economic development. It is, therefore, not easy to isolate elements of success nor to derive a blueprint reform package from the country's experience. For example, it is not clear whether trade policies such as the US–Vietnam BTA would have had the positive labour-market effects shown in previous studies without SEZs, which may have been instrumental in facilitating the required supply-side response.

What the evidence presented in this paper adds to the debate is marking how SEZs, with their liberal trade regimes, were the places where structural change and growth with inclusive characteristics – favouring low-skilled individuals and women – took place. In our view, they can form an important element – albeit only one – of an outward-oriented development strategy. Future research on SEZs should seek to gain a better understanding of how the nuances and implementation details of a particular programme shape its effectiveness and (labour-market) outcomes. We also believe that a systematic and comparative assessment of the role of complementary policies and other contextual factors will help to explain why place-based policies such as SEZ programmes work in some places but not in others.

Bibliography

Abebe, G., McMillan, M., Serafinelli, M., 2022. Foreign direct investment and knowledge diffusion in poor locations. Journal of Development Economics 158, 102926. https://doi.org/10.1016/j.jdeveco.2022.102926

Alfaro, L., Chor, D., 2023. Global Supply Chains: The Looming "Great Reallocation." NBER WORKING PAPER SERIES.

Alkon, M., 2018. Do special economic zones induce developmental spillovers? Evidence from India's states. World Development 107, 396–409. https://doi.org/10.1016/j.worlddev.2018.02.028

Baccini, L., Impullitti, G., Malesky, E.J., 2019. Globalization and state capitalism: Assessing Vietnam's accession to the WTO. Journal of International Economics 119, 75–92. https://doi.org/10.1016/j.jinteco.2019.02.004

Bilicka, K., Seidel, A., 2022. Measuring Firm Activity from Outer Space (No. w29945). National Bureau of Economic Research, Cambridge, MA. https://doi.org/10.3386/w29945

Callaway, B., Goodman-Bacon, A., Sant'Anna, P.H.C., 2021. Difference-in-Differences with a Continuous Treatment.

Cefalu, M., Vegetabile, B.G., Dworsky, M., Eibner, C., Girosi, F., 2020. Reducing bias in difference-in-differences models using entropy balancing.

Coxhead, I., Cuong, N.V., Vu, L.H., 2015. Migration in Vietnam: New Evidence from Recent Surveys. SSRN Journal. https://doi.org/10.2139/ssrn.2752834

Crescenzi, R., Limodio, N., 2021. The Impact of Chinese FDI in Africa: Evidence from Ethiopia. Geography and Environment Discussion Paper Series, Department of Geography and Environment, LSE, London, UK 22.

de Chaisemartin, C., D'Haultfœuille, X., 2022. Difference-in-differences estimators of intertemporal treatment effects. NBER WORKING PAPER SERIES.

Dercon, S., 2022. Gambling on Development: Why Some Countries Win and Others Lose. Hurst Publishers, London.

Dix-Carneiro, R., Kovak, B.K., 2019. Margins of labor market adjustment to trade. Journal of International Economics 117, 125–142. https://doi.org/10.1016/j.jinteco.2019.01.005

Erten, B., Leight, J., Tregenna, F., 2019. Trade liberalization and local labor market adjustment in South Africa. Journal of International Economics 118, 448–467. https://doi.org/10.1016/j.jinteco.2019.02.006

Farole, T., 2011. Special Economic Zones in Africa - Comparing Performance and Learning from Global Experience. Directions in Development. 328.

Frick, S.A., Rodríguez-Pose, A., Wong, M.D., 2019. Toward Economically Dynamic Special Economic Zones in Emerging Countries. Economic Geography 95, 30–64. https://doi.org/10.1080/00130095.2018.1467732

Fukase, E., 2013. Foreign Job Opportunities and Internal Migration in Vietnam, Policy Research Working Papers. The World Bank. https://doi.org/10.1596/1813-9450-6420

Galle, J., Overbeck, D., Riedel, N., Seidel, T., 2023. Place-based policies, structural change and female labor: Evidence from India's Special Economic Zones. STEG WORKING PAPER.

Goodman-Bacon, A., 2021. Difference-in-differences with variation in treatment timing. Journal of Econometrics, Themed Issue: Treatment Effect 1 225, 254–277. https://doi.org/10.1016/j.jeconom.2021.03.014

Gorg, H., Mulyukova, A., 2022. Place-Based Policies and Agglomeration Economies: Firm-Level Evidence from Special Economic Zones in India. SSRN Journal. https://doi.org/10.2139/ssrn.4114682

Hainmueller, J., 2012. Entropy Balancing for Causal Effects: A Multivariate Reweighting Method to Produce Balanced Samples in Observational Studies. Polit. anal. 20, 25–46. https://doi.org/10.1093/pan/mpr025

Hoekman, B., Sanfilippo, M., Tambussi, M., 2023. Foreign Direct Investment and Structural Transformation in Africa. SSRN Journal. https://doi.org/10.2139/ssrn.4328434

Hyun, Y., Ravi, S., 2018. Place-based Development: Evidence from Special Economic Zones in India. IED Working Paper 306 55.

ILO, 2022. Viet Nam's electronics supply chain. Geneva: International Labour Office.

Imai, K., Kim, I.S., Wang, E.H., 2021. Matching Methods for Causal Inference with Time-Series Cross-Sectional Data. American Journal of Political Science n/a. https://doi.org/10.1111/ajps.12685

ITC, 2021. Trade Map - List of products at 2 digits level exported by Viet Nam in 2021 [WWW Document]. URL https://www.trademap.org/Product_SelProductCountry.aspx?nvpm=1%7c704%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c1%7c1%7c1%7c1%7c1% 7c1 (accessed 5.3.23).

Liu, A.Y.C., Meng, X. (Eds.), 2019. Rural-Urban Migration in Vietnam, Population Economics. Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-94574-3

Lu, Y., Wang, J., Zhu, L., 2019. Place-Based Policies, Creation, and Agglomeration Economies: Evidence from China's Economic Zone Program. American Economic Journal: Economic Policy 11, 325–360. https://doi.org/10.1257/pol.20160272

Mayr-Dorn, K., Narciso, G., Dang, D.A., Phan, H., 2023. Trade Diversion and Labor Market Adjustment: Vietnam and the U.S.-China Trade War (preprint). SSRN. https://doi.org/10.2139/ssrn.4444393

McCaig, B., Pavcnik, N., 2018. Export Markets and Labor Allocation in a Low-Income Country. American Economic Review 108, 1899–1941. https://doi.org/10.1257/aer.20141096

McCaig, B., Pavcnik, N., 2017. Moving Out of Agriculture: Structural Change in Viet Nam, in: Structural Change, Fundamentals, and Growth: A Framework and Case Studies. International Food Policy Research Institute, Washington, DC.

McCaig, B., Pavcnik, N., Wong, W.F., 2022. FDI Inflows and Domestic Firms: Adjustments to New Export Opportunities. NBER WORKING PAPER SERIES 74.

McMillan, M., McCaig, B., 2019. Trade Liberalization and Labor Market Adjustment in Botswana (No. w26326). National Bureau of Economic Research, Cambridge, MA. https://doi.org/10.3386/w26326

Mendola, M., Prarolo, G., Sonno, T., 2021. Multinational Corporations and Labour Supply in Africa. SSRN Journal. https://doi.org/10.2139/ssrn.3898678

Nguyen, A., Lim, S., 2023. Structural Transformation in the Era of Trade Protectionism. SSRN Journal. https://doi.org/10.2139/ssrn.4426955

Roth, J., Sant'Anna, P.H.C., Bilinski, A., Poe, J., 2023. What's trending in difference-in-differences? A synthesis of the recent econometrics literature. Journal of Econometrics. https://doi.org/10.1016/j.jeconom.2023.03.008

Rotunno, L., Roy, S., Sakakibara, A., Vezina, P.-L., 2023. Trade Policy and Jobs in Vietnam: The Unintended Consequences of Trump's Trade War (preprint). SocArXiv. https://doi.org/10.31235/osf.io/9rdne

Tang, K., 2022. The political economy of special economic zones: the cases of Ethiopia and Vietnam. Review of International Political Economy 1–27. https://doi.org/10.1080/09692290.2022.2152073

Tien, D.N., Huong, N.Q., 2020. Assessment of Industrial Cluster Policies in Viet Nam: ERIA Discussion Paper Series 333, 36.

Tübbicke, S., 2022. Entropy Balancing for Continuous Treatments. Journal of Econometric Methods 11, 71–89. https://doi.org/10.1515/jem-2021-0002

Ulyssea, G., Ponczek, V., 2018. Enforcement of Labor Regulation and the Labor Market Effects of Trade: Evidence from Brazil. Discussion Paper Series IZA.

Vo, H., 2021. Understanding Urban Migration in Viet Nam: Evidence from a Micro–Macro Link. ADBI Working Paper Series.

Wang, J., 2013. The economic impact of Special Economic Zones: Evidence from Chinese municipalities. Journal of Development Economics 101, 133–147. https://doi.org/10.1016/j.jdeveco.2012.10.009

World Bank (Ed.), 2019. Technological innovation, supply chain trade, and workers in a globalized world: global value chains development report 2019. World Trade Organization, Washington, DC.

A Appendix

A.1 Vietnam's SEZs

Planning and establishment of SEZs in Vietnam

The planning and development of SEZs in Vietnam can be summarised in the following steps:

1) All Vietnamese SEZs are included in the country's 10-year National Master Plans and approved by the Prime Minister.
2) The MPI, together with other relevant ministries and especially the PPCs, will jointly decide on the inclusion of SEZs in the National Master Plans.
3) The PPCs grant final approval to private or public investors/developers to establish SEZs.
4) Developers/investors build basic SEZ infrastructure (power grid, roads, buildings).
5) Buildings/land are leased to other, mostly foreign, enterprises.
6) Provincial Management Boards manage SEZs (coordinate/communicate with private businesses, issue of permits/certificates, enforce regulations).

Mapping Vietnam's SEZs

To comprehensively map Vietnam's SEZs, we use the advanced capabilities of Google Earth Pro. As we describe in section 4.1, Vietnam's 608 SEZs can be divided according to how well we can capture their expansion over time via Google Earth satellite imagery:

Group I: 155 SEZs whose entire growth in built-up area can be traced through images over time. For these SEZs, there is a high-quality initial image when no SEZ had yet been built on the designated land – the "zero area image" – and its expansion can be clearly seen in images from later years. The Van Trung SEZ in Bac Giang Province, shown in Figure 2, is a good example of the expansion of SEZs in this group. Although it is not clear from the images exactly when construction began, we know that it must have been sometime between April 2009, when there were no sheds yet although the designated land is clearly visible, and January 2014, when eight sheds had been built.

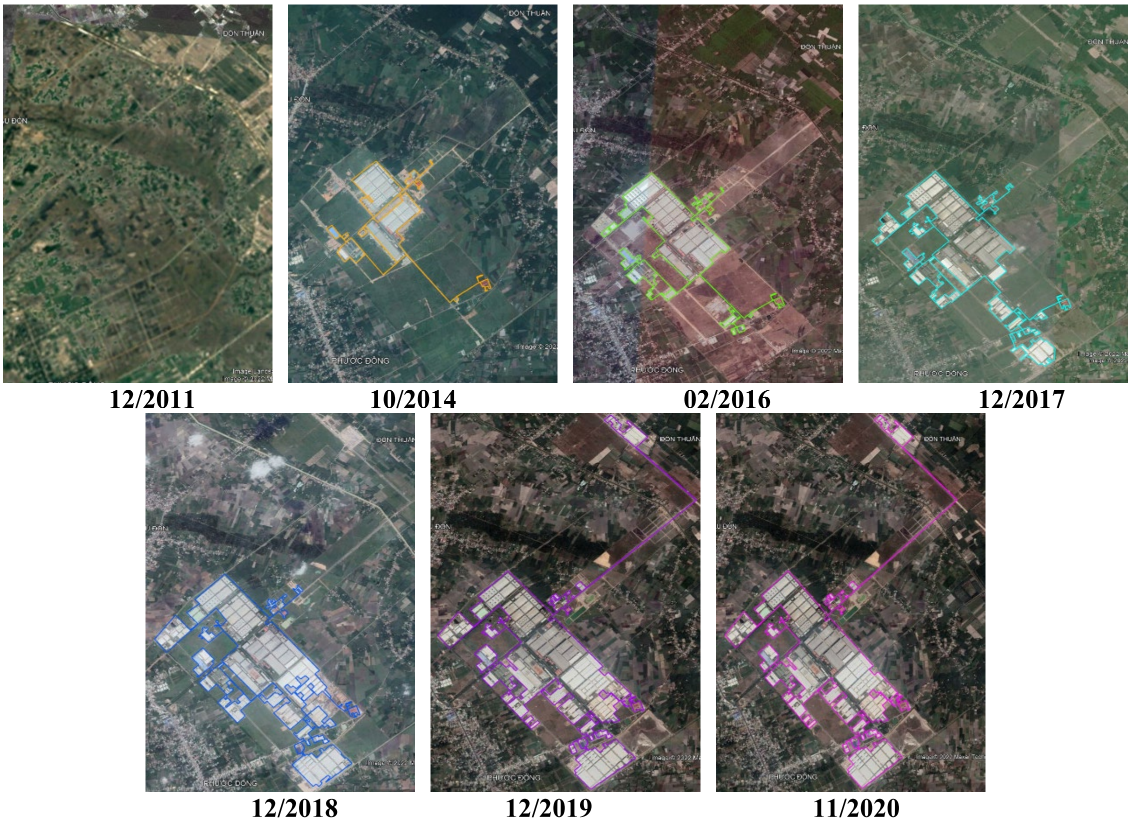
For 59 of the 154 SEZs in this group (38 per cent), we know the exact year construction started, because in these cases there is a satellite image showing an SEZ one year after the "zero area image." Importantly, even for SEZs where there are several years between the "zero area image" and the first image showing an SEZ (e.g. Van Trung), we can capture most of their expansion through frequent high-quality imagery in the following years: the average (median) built-up area of these SEZs on the initial image is with 17.9 ha (5.5) still much smaller than the 67.3 ha (40.9) in the most recent image.

Group II: 217 SEZs whose partial growth in built-up areas can be traced through images over time. These SEZs were already partially built on the first available high-quality image.

However, for most of these SEZs, we can capture most of their growth on satellite imagery from subsequent years. The expansion of the Phuoc Dong SEZ in Appendix Figure 1, the largest SEZ in our sample, is a good example of an SEZ in this group. The earliest image is from 12/2011, but it is of insufficient quality to assess whether or not the zone had been established by then or not. By the time SEZ Phuoc Dong was first detected on satellite imagery in October 2014, the sheds of the SEZ sheds had already occupied a significant portion of the designated land, so it is impossible to determine when construction of the SEZ began. However, most of the growth of the Group II SEZs can be traced in high-quality images from later years: with an average (median) built-up area of 30.3 (13.5) ha, the initial size is significantly smaller than the size in the latest image, with an average (median) built-up SEZ area of 79.2 (50.8) ha.

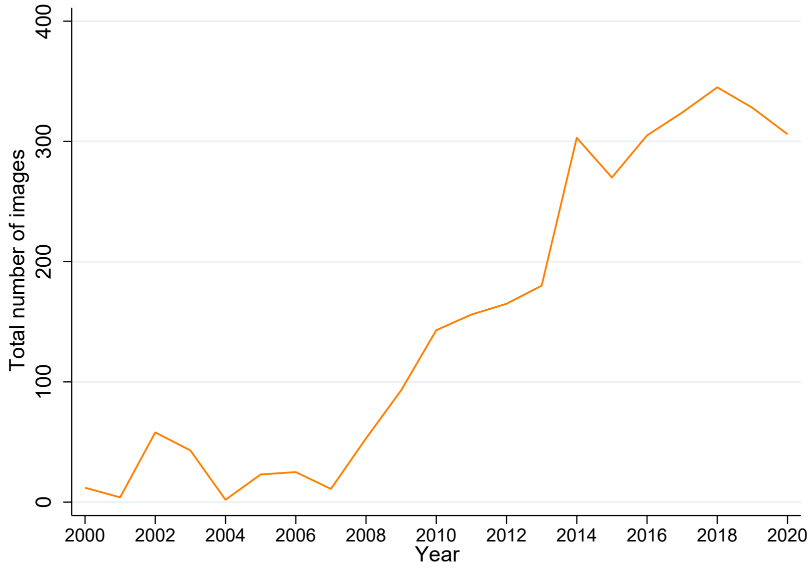
Group III: 236 approved SEZs that are not visible on any satellite imagery, although high-quality imagery is available. The SEZs in this third group are still in the planning stage and construction has not yet begun. The designated location of these approved SEZs is often visible on imagery.

Appendix Figure 1. The Expansion of SEZ Phuoc Dong



Source: Google Earth Pro.
Note: The figure shows the expansion of the SEZ Phuoc Dong over time using satellite imagery.

Appendix Figure 2. Total Number of Google Earth Images capturing Vietnam's SEZs



Source: Authors' own compilation, based on Google Earth Pro.
Note: The figure is based on the 372 SEZs established by 2019.

A.2 Vietnam Labour Force Surveys

To ensure national representativeness, the LFSs follow a two-stage sampling procedure. In the first stage, enumeration areas (EAs) are selected from Vietnam's 63 provinces (including five municipalities) which form the main strata, each of which is further divided into one rural and urban substratum. In the second stage, households are randomly selected from the EAs. Households are randomly resampled at each of the seven LFS waves between 2013 and 2019, so our sample is a repeated cross-section at the household level. Although households are not geo-referenced, we know for each one the district in which it is located, making our sample a district-level panel.

Between 2013 and 2019, the number of number of districts increased from 678 to 708, mainly due to the formation of new districts. The formation of new districts (and the dissolution or annexation of existing ones) is a multistep process driven by demographic, economic, or political factors. At the district level (second administrative level in Vietnam), a distinction is made between municipal cities (1), urban districts (48), district-level towns (50), provincial cities (80), and rural districts (529). For our analysis of the heterogeneous impact of SEZs by type of district, we group the first four into urban districts and the latter into rural districts.

A.3 Additional main and robustness results

Appendix Table 1. SEZ Exposure and Employment by Manufacturing Subsectors

	(1) Clothing=1	(2) Food & beverages=1	(3) Furniture & Wood=1	(4) Metals=1	(5) Minerals=1	(6) Electronics=1	(7) Plastics=1
SEZ exposure (area in 100 ha)	0.028***	-0.003***	0.001	0.001	-0.002	0.006**	0.002***
	(0.005)	(0.001)	(0.004)	(0.001)	(0.002)	(0.003)	(0.000)
Male=1	-0.064***	-0.007***	0.013***	0.021***	0.005***	-0.005***	0.001***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
SEZ exposure X Male=1	-0.021***	0.002***	0.003***	0.003***	0.002***	-0.002**	0.000
	(0.003)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Constant	0.088***	0.036***	0.029***	0.004***	0.008***	0.006***	0.002***
	(0.003)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.000)
Observations	1,790,090	1,790,090	1,790,090	1,790,090	1,790,090	2,216,714	1,790,090
Baseline mean men	0.016	0.022	0.027	0.017	0.009	0.003	0.002
Baseline mean women	0.061	0.026	0.015	0.003	0.005	0.004	0.002
R-squared	0.133	0.023	0.057	0.023	0.020	0.058	0.015
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Only individuals in employment are considered. Sector classifications follow ISIC Revision 4 codes. Individuals in clothing have the 2-digit code 13, 14, or 15, food & beverages have codes 10 or 11, furniture & wood have codes 16 or 31, minerals have code 23, electronics have codes 26 and 27, and plastics have code 2013. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 2. SEZ Exposure and (Log) Hourly Wages and Own-Account Income

	(1) Log hourly wage	(2) Log hourly wage	(3) Log hourly own-account income	(4) Log hourly own-account income
SEZ exposure (area in 100 ha)	0.068***	0.059***	0.041	0.029
	(0.014)	(0.014)	(0.031)	(0.028)
Male=1	0.159***	0.103***	0.279***	0.283***
	(0.004)	(0.003)	(0.009)	(0.008)
SEZ exposure X Male=1	-0.011***	-0.003**	-0.006	-0.006*
	(0.002)	(0.001)	(0.005)	(0.004)
Constant	4.227***	4.385***	4.204***	4.231***
	(0.012)	(0.012)	(0.016)	(0.014)
Observations	713,530	713,330	478,403	478,295
Baseline mean men	4.32	4.32	4.26	4.26
Baseline mean women	4.23	4.23	3.99	3.99
R-squared	0.410	0.512	0.334	0.461
Year dummies	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Sector dummies	No	Yes	No	Yes
Occupation dummies	No	Yes	No	Yes

Notes: Hourly wages and hourly own-account income are calculated by dividing each by the total number of hours worked in a month. Columns (1) and (2) include only wage workers, while columns (3) and (4) include only own-account workers. Data on own-account workers are only available from 2015 onwards. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 3. Impact of SEZ Exposure on Wages by Type of Occupation

	(1) Skilled agricultural workers	(2) Elementary agricultural workers	(3) Machine operator/assemblers	(4) Craft workers	(5) Professional service workers	(6) Sales and personal service workers
SEZ exposure (area in 100 ha)	0.052*	0.085***	0.050***	0.063***	0.039***	0.042***
	(0.030)	(0.024)	(0.012)	(0.017)	(0.009)	(0.008)
Male=1	0.171***	0.259***	0.200***	0.223***	0.134***	0.119***
	(0.024)	(0.014)	(0.007)	(0.008)	(0.005)	(0.005)
SEZ exposure X Male=1	-0.022***	-0.035***	-0.018***	-0.014***	0.005	-0.005*
	(0.008)	(0.008)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	8.133***	7.784***	8.246***	8.095***	7.963***	8.019***
	(0.021)	(0.011)	(0.019)	(0.015)	(0.049)	(0.009)
Observations	14,206	47,977	126,399	171,618	208,397	141,346
Baseline mean men	8.07	7.76	8.23	8.06	8.46	7.94
Baseline mean women	7.97	7.49	7.94	7.79	8.31	7.83
R-squared	0.390	0.408	0.432	0.385	0.374	0.287
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Occupation classifications follow ISCO-08 codes. Skilled agricultural workers have the code “6,” elementary agricultural workers have the code “92,” machine operators/assemblers have the codes “8” and “932,” craft workers have the codes “7” and “931,” professional-service workers have the codes “1–3,” and sales and personal-service workers have the codes “4” and “52–59.” Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 4. Impact of SEZ Exposure by Education

	(1) Worked in last 7 days=1	(2) Own-account and unpaid family workers=1	(3) Wage workers=1	(4) Agricultural household=1	(5) Non-agricultural household=1	(6) Private firm=1	(7) Foreign firm=1	(8) Skilled agricultural workers=1	(9) Elementary agricultural workers=1	(10) Machine operator/assemblers=1	(11) Craft workers=1	(12) Professional service workers=1	(13) Sales and personal service workers=1
SEZ exposure (area in 100 ha)	0.003	-0.025***	0.028***	-0.031***	0.002	0.001	0.019***	-0.014**	-0.017**	0.007	0.020***	0.001	0.005
	(0.009)	(0.004)	(0.005)	(0.008)	(0.006)	(0.005)	(0.007)	(0.006)	(0.008)	(0.004)	(0.007)	(0.001)	(0.007)
SEZ exposure X Primary=1	0.006	0.007***	-0.007***	0.003	-0.010***	0.000	0.008**	-0.002	0.008	0.014***	-0.013***	-0.000	-0.009***
	(0.006)	(0.002)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)	(0.003)	(0.004)	(0.000)	(0.003)
SEZ exposure X Lower Secondary=1	0.017***	0.004	-0.004	0.009	-0.024***	-0.001	0.019***	0.001	0.012*	0.024***	-0.022***	-0.001	-0.018***
	(0.006)	(0.004)	(0.004)	(0.008)	(0.005)	(0.006)	(0.005)	(0.003)	(0.007)	(0.005)	(0.004)	(0.000)	(0.004)
SEZ exposure X Higher Secondary=1	0.015**	0.008	-0.006	0.022***	-0.037***	-0.006	0.028***	0.003	0.025***	0.023***	-0.025***	-0.001	-0.027***
	(0.006)	(0.005)	(0.006)	(0.009)	(0.007)	(0.007)	(0.007)	(0.003)	(0.007)	(0.006)	(0.005)	(0.001)	(0.004)
SEZ exposure X Vocational=1	0.016**	0.037***	-0.037***	0.044***	-0.022***	-0.001	0.008*	0.009**	0.040***	-0.002	-0.028***	0.007**	-0.024***
	(0.006)	(0.007)	(0.007)	(0.010)	(0.005)	(0.006)	(0.005)	(0.003)	(0.008)	(0.005)	(0.005)	(0.003)	(0.005)
SEZ exposure X University=1	0.007	0.049***	-0.051***	0.048***	-0.011**	0.000	0.005	0.011***	0.043***	-0.011**	-0.026***	-0.000	-0.014***
	(0.007)	(0.008)	(0.009)	(0.011)	(0.005)	(0.006)	(0.006)	(0.004)	(0.009)	(0.005)	(0.006)	(0.002)	(0.005)
Constant	0.469***	0.617***	0.388***	0.620***	0.257***	0.095***	0.053***	0.093***	0.449***	0.086***	0.116***	0.001	0.258***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.004)	(0.004)	(0.005)	(0.012)	(0.004)	(0.005)	(0.002)	(0.008)
Observations	2,216,128	1,790,060	1,790,060	1,788,617	1,788,617	1,788,617	1,788,617	1,790,077	1,790,077	1,790,077	1,790,077	1,790,077	1,790,077
Baseline mean men	0.771	0.578	0.389	0.439	0.321	0.085	0.018	0.111	0.337	0.089	0.177	0.115	0.166
Baseline mean women	0.675	0.684	0.300	0.471	0.297	0.065	0.034	0.082	0.387	0.053	0.073	0.132	0.272
R-squared	0.088	0.289	0.280	0.340	0.127	0.122	0.183	0.197	0.326	0.117	0.102	0.585	0.120
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: In columns (2) to (13), only individuals in employment are considered. Occupation classifications follow ISCO-08 codes. Skilled agricultural workers have the code “6,” elementary agricultural workers have the code “92,” machine operators/assemblers have the codes “8”and “932,” craft workers have the codes “7” and “931,” professional-service workers have the codes “1–3,” and sales and personal-service workers have the codes “4” and “52–59.” Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 5. Residence Duration and Migration Patterns

	Freq.	Col %
Duration of residence in current ward/town/commune		
Under 12 months	24725	1.5
12 months to 5 years	65787	4
5 years or more	1534189	94.4
Total	1624701	100
Origin province before current residence		
Same province	56918	62.9
Different province	33594	37.1
Total	90512	100
Main reason for moving to current commune/ward/town		
Find or start work	18313	20.3
Family and marriage	44466	49.4
Education	7154	7.9
Other	20138	22.4
Total	90071	100

Notes: The table only includes data from 2015 onwards, as the duration of residence in the current ward, town, commune is not available at the same level of detail for earlier years.

Appendix Table 6. SEZ Exposure and Migrants' Reasons for Moving to Current Ward, Town, Commune

	(1) Find or start work=1	(2) Family and marriage=1	(3) Education=1
SEZ exposure (area in 100 ha)	0.051***	-0.013	-0.010
	(0.016)	(0.015)	(0.008)
Male=1	0.092***	-0.213***	0.017***
	(0.006)	(0.009)	(0.005)
SEZ exposure X Male=1	-0.000	0.013***	-0.001
	(0.002)	(0.003)	(0.001)
Constant	0.182***	0.503***	0.018
	(0.017)	(0.017)	(0.012)
Observations	89,826	89,826	89,826
Baseline mean men	0.278	0.315	0.091
Baseline mean women	0.148	0.584	0.078
R-squared	0.236	0.264	0.368
Year dummies	Yes	Yes	Yes
District dummies	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Notes: Only migrants are considered. Migrants are defined as those individuals who have lived in their current location for less than five years. Data are only available from 2015 onwards. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 7. Employment Characteristics of Migrants and Residents

	Own-account and family worker	Wage worker	Agriculture	Manufacturing	Construction	Services	Foreign firm	Total observations
Migrants	0.30	0.67	0.15	0.29	0.06	0.49	0.13	90,512
Residents	0.57	0.41	0.41	0.14	0.08	0.36	0.03	1,534,189

Notes: Migrants are defined as those individuals who have lived in their current location for less than five years. Residents are defined as those who have lived in their current location for five or more years. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services, and those with a code that is part of sections "B," "D," "E," and "F" in Construction.

Appendix Table 8. Share of Migrants/Residents across Sectors (left) and Firm Types (right)

	Agriculture, Services and Construction	Manufacturing	Total
Migrant	4.34	9.97	5.20
Resident	95.66	90.03	94.80
Total	100	100	100

	Domestic firm	Foreign firm	Total
Migrant	4.70	17.20	5.20
Resident	95.30	82.80	94.80
Total	100	100	100

Notes Migrants are individuals who have lived at their current place for less than five years. Residents those who have lived at their current place for five or more years. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services, and those with a code that is part of sections "B," "D," "E," and "F" in Construction.

Appendix Table 9. Impact of SEZ Exposure by Type of District

	(1) Own-account and unpaid family workers=1	(2) Wage workers=1	(3) Agriculture=1	(4) Manufacturing=1	(5) Services=1	(6) Log wage
SEZ exposure (area in 100 ha)	-0.005	0.006	-0.013	0.028***	-0.011**	0.061***
	(0.005)	(0.005)	(0.010)	(0.007)	(0.005)	(0.020)
SEZ exposure X Rural District=1	-0.014**	0.016**	0.001	0.002	-0.007	-0.014
	(0.007)	(0.007)	(0.013)	(0.009)	(0.009)	(0.020)
Constant	0.654***	0.337***	0.429***	0.192***	0.324***	8.089***
	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.012)
Observations	1,790,060	1,790,060	1,790,085	1,790,085	1,790,085	715,141
Baseline mean urban	0.447	0.513	0.179	0.173	0.556	8.19
Baseline mean rural	0.715	0.268	0.594	0.094	0.256	8.03
R-squared	0.286	0.278	0.336	0.155	0.233	0.365
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Only individuals in employment are considered. In column (6), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services, and those with a code that is part of sections "B," "D," "E," and "F" in Construction. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 10. Road Density within 1,500 Metres of SEZs

Year	Group II: Never exposed, planned	Group III: Exposed after 2013	Group IV: Always exposed
2013	1.7	1.4	5.1
2019	4.1	8.5	22.5

Note: Road density is calculated as the total number of roads that are within 1,500 metres of the SEZ using OSM road-network data.

Appendix Table 11. Impact of SEZ Exposure on Road Density

	(1) Road density
SEZ area in 100 ha	6.243***
	(1.718)
Constant	4.632***
	(1.156)
Observations	1967
Baseline mean	3.82
R-squared	0.773
Year dummies	Yes
District dummies	Yes

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Note: Road density is calculated as the total number of roads that are within 1,500 metres of the SEZ using OSM road-network data.

Appendix Table 12. Impact of SEZ Exposure Controlling for Road Density

	(1) Own-account and unpaid family workers=1	(2) Wage workers=1	(3) Agriculture=1	(4) Manufacturing=1	(5) Services=1	(6) Log wage
SEZ exposure (area in 100 ha)	-0.016***	0.019***	-0.013	0.034***	-0.022***	0.065***
	(0.003)	(0.004)	(0.008)	(0.005)	(0.006)	(0.013)
SEZ exposure X Male=1	0.011***	-0.011***	0.004**	-0.012***	0.011***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Road density	0.000	-0.000	0.000**	-0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male=1	-0.126***	0.107***	-0.013*	-0.038***	-0.092***	0.193***
	(0.005)	(0.005)	(0.007)	(0.005)	(0.006)	(0.007)
Constant	0.626***	0.364***	0.391***	0.218***	0.331***	8.074***
	(0.006)	(0.007)	(0.009)	(0.007)	(0.007)	(0.016)
Observations	796,425	796,425	796,450	796,450	796,450	375,787
Baseline mean men	0.578	0.389	0.454	0.112	0.319	8.16
Baseline mean women	0.684	0.300	0.471	0.126	0.383	8.03
R-squared	0.267	0.261	0.287	0.172	0.196	0.354
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Road density is calculated as the total number of roads that are within a 1,500-metre radius of the SEZ using OSM road-network data. Only individuals in employment are considered. In column (6), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, and those with a code that is part of sections "G–U" in Services. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 13. Impact of SEZ Exposure Using Alternative EB Weights

	(1) Agriculture=1 HM	(2) Agriculture=1 HR	(3) Agriculture=1 TM	(4) Agriculture=1 TR	(5) Manufacturing=1 HM	(6) Manufacturing=1 HR	(7) Manufacturing=1 TM	(8) Manufacturing=1 TR	(9) Services=1 HM	(10) Services=1 HR	(11) Services=1 TM	(12) Services=1 TR	(13) Log wage HM	(14) Log wage HR	(15) Log wage TM	(16) Log wage TR
SEZ exposure (area in 100 ha)	-0.014**	-0.015**	0.002	-0.015	0.037***	0.039***	0.028***	0.028***	-0.020***	-0.023***	-0.016	-0.026**	0.062***	0.058***	0.054***	0.057***
	(0.007)	(0.007)	(0.012)	(0.012)	(0.005)	(0.006)	(0.008)	(0.008)	(0.006)	(0.006)	(0.010)	(0.010)	(0.011)	(0.012)	(0.009)	(0.016)
Male=1	-0.011**	-0.006	-0.011	-0.005	-0.031***	-0.042***	-0.018**	-0.018**	-0.087***	-0.086***	-0.087***	-0.085***	0.191***	0.194***	0.195***	0.189***
	(0.005)	(0.006)	(0.010)	(0.012)	(0.003)	(0.004)	(0.007)	(0.007)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)
SEZ exposure X Male=1	0.004***	0.003	-0.012	-0.019	-0.014***	-0.011***	0.002	0.002	0.009***	0.009***	-0.000	0.002	-0.014***	-0.015***	-0.010***	-0.008
	(0.002)	(0.002)	(0.021)	(0.020)	(0.003)	(0.002)	(0.015)	(0.015)	(0.002)	(0.002)	(0.006)	(0.007)	(0.002)	(0.002)	(0.003)	(0.009)
Constant	0.432***	0.383***	0.560***	0.544***	0.187***	0.224***	0.124***	0.124***	0.326***	0.336***	0.269***	0.272***	8.082***	8.096***	8.023***	8.021***
	(0.006)	(0.007)	(0.011)	(0.012)	(0.004)	(0.005)	(0.007)	(0.007)	(0.005)	(0.005)	(0.006)	(0.008)	(0.011)	(0.010)	(0.009)	(0.011)
Observations	1,790,085	1,789,302	1,777,875	1,741,143	1,790,085	1,789,302	1,777,875	1,777,875	1,790,085	1,789,302	1,777,875	1,741,143	715,141	715,111	710,490	696,608
Baseline mean men	0.454	0.454	0.454	0.454	0.112	0.112	0.112	0.112	0.319	0.319	0.319	0.319	8.16	8.16	8.16	8.16
Baseline mean women	0.471	0.471	0.471	0.471	0.126	0.126	0.126	0.126	0.383	0.383	0.383	0.383	8.03	8.03	8.03	8.03
R-squared	0.334	0.298	0.340	0.325	0.156	0.153	0.106	0.106	0.232	0.203	0.271	0.253	0.363	0.362	0.373	0.365
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: HM denotes the results based on EB weights with binary treatment and the original set of covariates. HR denotes the results based on EB weights with binary treatment and the extended set of variables. TM denotes the results based on EB weights with continuous treatment and the original set of covariates. TR denotes the results based on EB weights with continuous treatment and the extended set of covariates. Only individuals in employment are considered. In columns (13) to (16), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, and those with a code that is part of "G–U" in Services. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 14. Impact of SEZ Exposure Using Different Samples

	(1) Agriculture=1 Full sample	(2) Agriculture=1 Group II and III	(3) Agriculture=1 Group IV	(4) Manufacturing=1 Full sample	(5) Manufacturing=1 Group II and III	(6) Manufacturing=1 Group IV	(7) Services=1 Full sample	(8) Services=1 Group II and III	(9) Services=1 Group IV	(10) Log wage Full sample	(11) Log wage Group II and III	(12) Log wage Group IV
SEZ exposure (area in 100 ha)	-0.014**	0.003	-0.019***	0.037***	0.040***	0.034***	-0.020***	-0.044***	-0.015***	0.062***	0.057***	0.070***
	(0.007)	(0.005)	(0.006)	(0.005)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.011)	(0.011)	(0.014)
Male=1	-0.011**	-0.033**	-0.006	-0.031***	-0.033***	-0.039***	-0.087***	-0.091***	-0.093***	0.191***	0.199***	0.192***
	(0.005)	(0.013)	(0.008)	(0.003)	(0.008)	(0.006)	(0.004)	(0.011)	(0.007)	(0.005)	(0.014)	(0.008)
SEZ exposure X Male=1	0.004***	0.026***	0.002	-0.014***	-0.029***	-0.012***	0.009***	0.010	0.011***	-0.014***	-0.045***	-0.013***
	(0.002)	(0.006)	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.007)	(0.003)	(0.002)	(0.009)	(0.002)
Constant	0.432***	0.484***	0.381***	0.187***	0.186***	0.221***	0.326***	0.266***	0.340***	8.082***	8.082***	8.068***
	(0.006)	(0.012)	(0.009)	(0.004)	(0.008)	(0.009)	(0.005)	(0.008)	(0.007)	(0.011)	(0.013)	(0.022)
Observations	1,790,085	257,670	538,780	1,790,085	257,670	538,780	1,790,085	257,670	538,780	715,141	102,029	273,758
Baseline mean men	0.454	0.454	0.287	0.112	0.119	0.183	0.319	0.294	0.382	8.16	8.11	8.2
Baseline mean women	0.471	0.476	0.305	0.126	0.138	0.209	0.383	0.363	0.459	8.03	7.95	8.06
R-squared	0.334	0.268	0.290	0.156	0.128	0.178	0.232	0.189	0.196	0.363	0.310	0.361
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

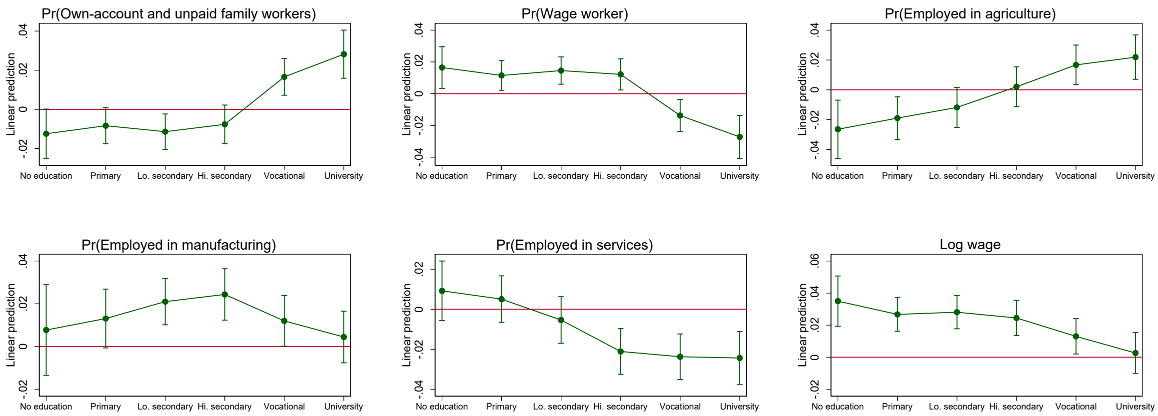
N*otes:* The "full sample" columns show our baseline results. The "Group II and III" columns only include the 88 untreated Group II districts that are planning an SEZ in the control group and the 19 Group III districts that are treated after 2013 in the treatment group. The "Group IV" columns include only the 200 always-treated Group IV districts that became more exposed over time. Only individuals in employment are considered. In columns (10) to (12), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, and those with a code that is part of sections "G–U" in Services. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Table 15. Impact of SEZ Exposure (No Imputation)

	(1) Own-account and unpaid family workers=1	(2) Wage worker=1	(3) Agriculture=1	(4) Manufacturing=1	(5) Services=1	(6) Log wage
SEZ exposure (area in 100 ha)	-0.015***	0.017***	-0.008	0.029***	-0.019***	0.054***
	(0.003)	(0.004)	(0.006)	(0.006)	(0.005)	(0.010)
Male=1	-0.117***	0.098***	-0.008*	-0.032***	-0.088***	0.193***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.005)
SEZ exposure X Male=1	0.010***	-0.010***	0.004***	-0.014***	0.009***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.652***	0.339***	0.421***	0.195***	0.329***	8.102***
	(0.004)	(0.004)	(0.006)	(0.004)	(0.005)	(0.010)
Observations	1,693,121	1,693,121	1,693,139	1,693,139	1,693,139	673,399
Baseline mean men	0.578	0.389	0.454	0.112	0.319	0.114
Baseline mean women	0.684	0.300	0.471	0.126	0.383	0.019
R-squared	0.287	0.278	0.338	0.159	0.232	0.364
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
District dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results when leaving the values for the gap years as missing instead of interpolating them linearly. Only individuals in employment are considered. In column (6), only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, and those with a code that is part of sections "G–U" in Services. Standard errors are reported in parentheses, clustered at district level. ***p < 0.01, **p < 0.05, *p < 0.1.

Appendix Figure 3 Impact of SEZ Exposure (100 ha Increase in Built-Up SEZ Area) on Residents by Education

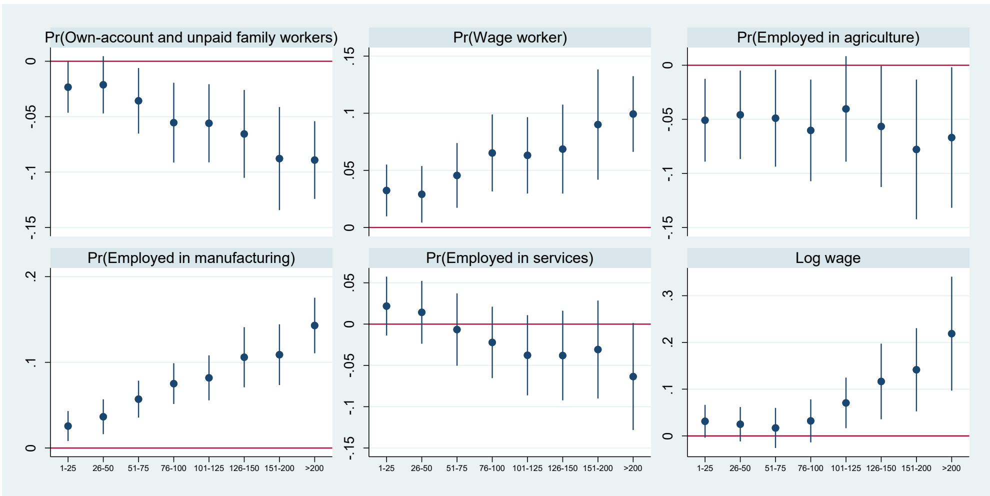


Notes: Only residents in employment are considered in all panels. In the bottom right-hand panel, only resident wage workers are considered. Residents are defined as those individuals who have lived in their current location for five or more years. The figure is based on regressions including data from 2015 onwards, as the duration of residence in the current ward, town, commune is not available at the same level of detail for earlier years. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, those with a code that is part of sections "G–U" in Services.

Appendix Figure 4. Distribution of SEZs across Districts in Cà Mau Province

Source: Google Earth Pro.

Appendix Figure 5. Size-Specific Impacts of SEZ Exposure



Notes: Only individuals in employment are considered in all panels. In the bottom right-hand panel, only wage workers are considered. The sectoral classifications follow ISIC Revision 4 codes. Individuals employed in a firm with a 4-digit ISIC code that is part of section "A" are classified in Agriculture, those with a code that is part of section "C" in Manufacturing, and those with a code that is part of "G–U" in Services.

GIGA Working Papers

German Institute for Global and Area Studies
Leibniz-Institut für Globale und Regionale Studien

Recent Issues

No 337 Yannick Deepen and Sabine Kurtenbach: Coping with Complexity: Dealing with Non-State Armed Actors, November 2023

No 336 Christian von Soest: How Authoritarian Regimes Counter International Sanctions Pressure, September 2023

No 335 Katharina Fietz and Jann Lay: Digitalisation and Labour Markets in Developing Countries, June 2023

No 334 Aurel Croissant, David Kuehn, Ariam Macias-Weller, and David Pion-Berlin: Militarisation of COVID-19 Responses and Autocratisation: A Comparative Study of Eight Countries in Asia-Pacific and Latin America, June 2023

No 333 Jann Lay and Tevin Tafese: Africa's Emergent Tech Sector: Its Characteristics and Impact on Development and Labour Markets, April 2023

No 332 Jasmin Lorch, Monika Onken, and Janjira Sombatpoonsiri: Sustaining Civic Space in Times of COVID-19: Global Trends, September 2022

No 331 Maria Josua: Justifications of Repression in Autocracies: An Empirical Analysis of the Maghreb, 2000–2010, August 2022

No 330 Leonardo Bandarra et al.: Global South Perspectives on a Global Ban on Nuclear Weapons: A Comparative Approach, July 2022

No 329 André Bank, Yannick Deepen, Julia Grauvogel, and Sabine Kurtenbach: COVID-19 and Violent Actors in the Global South: An Inter- and Cross-Regional Comparison, May 2022

No 328 Alexander De Juan, Daniel Geissel, Jann Lay, and Rebecca Lohmann: Large-Scale Land Deals and Social Conflict: Evidence and Policy Implications, May 2022

No 327 Matthias Basedau and Mora Deitch: One Year After: Has the COVID-19 Pandemic Increased Violence in Sub-Saharan Africa?, September 2021

No 326 Mariana Llanos and Cordula Tibi Weber: High Courts and Social Media in Latin America, May 2021

No 325 Chanchal Kumar Sharma: The Political Economy of India's Transition to Goods and Services Tax, January 2021

No 324 Selman Almohamad, Markus Kirchschlager, and Sabine Kurtenbach: Peacebuilding after War and Violence – Neighbourhood Matters, December 2020

All GIGA Working Papers are available free of charge at
<www.giga-hamburg.de/en/publications/giga-working-papers/>.
For any requests please contact: <workingpapers@giga-hamburg.de>.
WP Coordinator: Dr. James Powell.

German Institute for Global and Area Studies (GIGA) / Leibniz-Institut für Globale und Regionale Studien
Neuer Jungfernstieg 21 • 20354 Hamburg • Germany
E-mail: <info@giga-hamburg.de> • Website: <www.giga-hamburg.de>