Building Through Downturns: Export Slowdown and Construction in China

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Abstract

This paper studies how city governments in China use construction job creation to address the mid-2010s export slowdown, which significantly reduced manufacturing employment, and explores its longer-term effects. I document that cities more exposed to the export slowdown experienced an increase in construction employment. This effect is particularly prominent in cities under leaders with stronger career incentives, as construction employment creation is associated with higher promotion probabilities. One mechanism to create construction projects is through government land sales: (i) residential and commercial land sales bring real estate projects, and (ii) land sales revenue finance infrastructure projects. However, in the longer term, this land sales strategy is associated with housing oversupply and higher real estate risks.

Keywords: Negative economic shocks; Local government; Construction employment; Politician's career incentives; Land sales
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1 Introduction

Many governments rely on infrastructure and housing construction to boost employment and stabilize the economy during downturns. For instance, the Public Works Administration in the United States was set up to reduce unemployment during the Great Depression by hiring workers to build public infrastructure. Beyond their economic benefits, these construction projects carry political incentives, as politicians need to manage economic shocks well to stay in power.[1] A concern is that politicians may trade off the efficiency of particular construction projects for additional employment creation. Thus, while these construction projects in the short term create jobs and promote social stability, they may lead to inefficiencies in resource allocation in the longer term, particularly when political motivations drive the decision-making. This raises important questions: How and why do governments use construction projects to address negative economic shocks? And, what are the long-term consequences of relying on construction projects to respond to these shocks?

In this paper, I examine how city governments in China use the employment creation through construction projects to respond to negative economic shocks and provide evidence of the longer-term effects of their responses. This exploration is particularly intriguing given China's large-scale investments in infrastructure and real estate projects, which make it the largest construction market in the world. Additionally, it is widely discussed that Chinese governments often rely on the construction sector to address economic challenges.[2] Despite such discussions, empirical evidence directly linking negative economic shocks to the development of the construction sector remains scarce. Moreover, little is known about the specific drivers and long-term consequences of using the construction sector as a response to such shocks.

To examine the relationship between negative economic shocks and construction development, I exploit the setting of a marked slowdown in China's exports between 2013 and 2016, during which China's annual export growth rate dropped sharply from 24.7% (between 2001 and 2008) to only 0.8% (between 2013 and 2016).[3] This slowdown was largely driven by the sluggish global trade growth after the 2008 global financial crisis

[1] Employment is a key priority of the government's agenda. Rising unemployment is associated with less support for the incumbents (Garz and Martin, 2021).

[2] As put by *The New York Times* (August 22, 2023): "Beijing has often addressed economic troubles by boosting spending on infrastructure and real estate."

[3] The numbers are calculated based on UN Comtrade. And the export growth rate went negative in years 2015 and 2016.

(World Bank, 2020). Due to varying recovery rates in the main importing countries, different export products experienced different levels of slowdown, resulting in cities with different compositions of export products being exposed to varying levels of export slowdown. This variation provides a unique setting to explore the impact of negative economic shocks on construction development.

I adopt a shift-share instrumental variable (SSIV) approach to identify the impact of the export slowdown following Campante et al. (2023). The SSIV measures each city's exposure to the export slowdown by combining product-level shifts in the global trade change (excluding China) with each city's initial product mix. The underlying idea is that cities exporting more goods to countries that were hit and did not recover well from the financial crisis experienced more severe export slowdown. Meanwhile, the product-level changes in global trade, which depend on the varying recovery in export destinations, provide a source of exogeneity. To validate the SSIV's exogeneity, I follow Borusyak et al. (2022) and validate that the product-level shocks are as good as randomly assigned, which ensures the exogeneity of the SSIV.

I first examine how the export slowdown affects employment. The slowdown caused an immediate decrease in manufacturing employment, which accounts for 95.11% of the employment decline in all sectors, except for the agricultural sector, due to the export slowdown. However, cities more exposed to the export slowdown experience an increase in construction employment in the subsequent period.[4] On average, a one-standard-deviation increase in exposure to the export slowdown, equivalent to a $753 reduction in export value per worker, leads to a 0.13 percentage point increase in the share of the working-age population employed in the construction sector. This increase represents approximately 2.27% of the average construction sector size. Notably, the construction sector is the only sector that experienced an employment increase following the export slowdown, offsetting 9.38% of the manufacturing employment loss. This finding highlights the pivotal role of the construction sector in absorbing displaced workers during economic downturns.

The increase in construction employment during the export slowdown is particularly driven by cities led by leaders with stronger career incentives, measured by their ages and patronage ties. The rationale is that leaders who are not yet approaching retirement and those seeking to secure associated rewards from patron-client relationships have greater incentives to perform well. Specifically, the impact of the export slowdown on

[4]All the employment variables are normalized using the city's working age population obtained from the 2010 Census. The employment data on the agricultural sector is not available.

the increase in construction employment is approximately two times greater in cities led by younger leaders and three times greater in cities led by politically connected leaders, compared to the average impact across all leaders. This heterogeneity by career incentives is consistent with the finding that construction employment creation is associated with a higher probability of city leaders getting promoted. During the export slowdown period, a one-percentage-point increase in construction employment is associated with approximately a 1% higher likelihood of city leaders being promoted to higher-ranking political positions. This suggests that construction employment creation during the export slowdown serves as a signal of city leaders' efforts and capabilities in the cadre-evaluation system, incentivizing them to boost construction employment in response to the export slowdown.

To understand the mechanism that drives the increase in construction employment, I explore the strategy city governments may use by leveraging the institutional feature that local governments in China have autonomy in managing and selling land use rights within their jurisdiction (hereafter using selling land to refer to selling land use rights). In China, the state owns the land and local governments act as monopolists in the land markets.[5] Selling land can boost construction projects through two main channels. First, increased sales of residential and commercial land will bring more housing construction projects by real estate developers. Second, city governments get land sales revenue, which provides a major source of funding for city infrastructure projects. By law, local governments are required to allocate land sales revenue to specific expenditures such as land acquisition, city construction projects, and other land-related expenditures (State Council, 2006). Therefore, an increase in land sales revenue gives local governments more capacity to construct infrastructure projects. I find evidence supporting land sales as the mechanism of increasing construction employment. I show that cities more exposed to the export slowdown have higher land sales revenue, primarily driven by more area sales of residential and commercial land intended for real estate development. These cities more exposed to the export slowdown also have more real estate projects, as indicated by increased real estate investment, and more infrastructure projects, as evidenced by more constructed roads, following the export slowdown.

What is the longer-run impact of using land sales as a strategy to boost construction projects during the export slowdown period? I explore this question through the lens

[5]Note that the central government sets national land quota and allocates the quota across regions. Local governments' land sales are subject to this quota constraint.

of the real estate market in the longer term.[6] I find that cities with higher land sales revenue during the export slowdown period have a larger volume of unsold residential floor space to be sold, suggesting an oversupply of housing. Additionally, these cities also face higher real estate risks, measured by the occurrence of homeowners' protests over presold but stalled construction apartments. These protests often stem from real estate developers' inability to repay debts and continue construction projects, indicating that the government's push for residential land sales and real estate development can contribute to the unhealthy financial status of real estate firms. These findings point to the potential long-term costs of governments using land sales as a strategy to mitigate the effects of economic downturns.

This paper contributes to the following three strands of literature. The first strand is the literature studying government responses to negative shocks, particularly shocks that lead to deteriorating labor market outcomes. Existing studies highlight the importance of employment for politicians to hold office. In democracies, rising unemployment tends to reduce support for incumbents (Fair, 1978; Garz and Martin, 2021), prompting employment-friendly policies to boost employment, especially before the election (Foremny and Riedel, 2014). In authoritarian regimes, employment also plays a critical role in maintaining stability, as job loss and income decline are associated with participation in unrest that can threaten regime survival (Bazzi and Blattman, 2014; Campante et al., 2023). Relatedly, employment is thus used as a tool to mitigate shocks and prevent potential unrest (Blattman and Annan, 2016; Wen, 2022). This paper adds to this literature by showing how Chinese city governments respond to the export slowdown by creating construction jobs and how this construction employment creation aligns with city leaders' career incentives.

This paper also adds to the literature on the effect of trade shocks (Autor et al., 2013, 2020; Acemoglu et al., 2016; Dix-Carneiro and Kovak, 2017; Feigenbaum and Hall, 2015; etc.). While much of this research focuses on the impact of rising import competition from China, this paper studies the context of export slowdown in China. Within this context, Campante et al. (2023) show that the export slowdown increases labor unrest, negatively affecting city leaders' career trajectories. In response, city leaders increase stability control by increasing expenditure and emphasis on social stability and security. Ma et al. (2022) find that cities more exposed to the export slowdown experienced higher crime rates. This paper contributes to the literature by showing how city governments

[6] I examine the impact four to five years after the export slowdown, focusing on the years 2019 and 2020 due to data availability.

address manufacturing employment loss by creating construction employment, with land sales being one mechanism.

Finally, China's recent real estate issues have been linked to the institutional feature of governments' land sales (Xiong, 2023). This paper connects to the literature studying factors driving Chinese governments' land sales. The current literature provides three main explanations for why local governments in China are inclined to sell more land. First, fiscal pressure, resulting from the tax reform that requires local governments to share tax revenue with the central government, has been argued to increase local governments' incentives to boost land sales revenue, which is an off-budgetary revenue (Han and Kung, 2015). Second, promotion incentives drive political leaders to sell more land because land sales can stimulate real estate development and the urbanization process (Wang et al., 2020; Chen and Kung, 2016). Third, rent-seeking behavior related to land sales revenue has been documented as another motivating factor (Chen and Kung, 2019, 2016). My study contributes to this literature by showing that selling land is adopted by local governments as a tool to buffer negative economic shocks.

2 Institutional Background

In this section, I present the institutional background of China's export slowdown during the mid-2010s, the political system, and land sales in China.

2.1 Export Slowdown in the Mid-2010s

Export has been a primary driver of China's economic growth since 1990s. The average annual export growth rate of China has reached 24.7% between 2001 and 2008.[7] Since the 2008 global financial crisis, the export growth rate of China decreases, mostly driven by the sluggish global trade growth (World Bank, 2020). Figure 1 plots the time series of China's export growth rate and the export growth rate of the rest of the world from 2001 to 2022. China's annual export growth rate decreases to merely 0.8% between 2013 and 2016.

In this paper, I define the period from 2013 to 2016 as the export slowdown period for several reasons. First, as shown in Figure 1, despite the 2008 financial crisis, China (and the global economy) experienced a rebound in export growth in 2010. The consistent decline in export growth occurred between 2013 and 2016, with growth turning negative

[7]The figure is calculated using data from UN Comtrade.

in 2015 and 2016, which supports the 2013 to 2016 as the export slowdown period (marked as a gray region in the figure). Secondly, I exclude years prior to 2012 to avoid potential confounding effects from the extraordinary stimulus program known as the "4 trillion yuan stimulus". Announced in 2008, this stimulus package aimed to stimulate the slumped export-driven economy in the wake of the financial crisis by boosting investment in infrastructure and social welfare. Moreover, this stimulus was largely financed by local governments, with government land sales revenue being an important finance source. As a result, the stimulus period could potentially confound both export slowdown exposure and construction related measures. Finally, the years after 2017 are excluded to avoid the potential confounding effects of the US-China trade war.

Given the prominent role of exports in China's economy, the slowdown in exports generates negative effects on the economy. Campante et al. (2023) document the negative effect of export slowdown on the city's night light intensity, average income, and manufacturing employment. They also show these cities have more incidents of labor unrest. Ma et al. (2022) document export slowdown's effect on increasing the city's crime rate.

2.2 China's Regionally Decentralized Authoritarian System

China's fundamental institution is described as a regionally decentralized authoritarian (RDA) regime, which is a combination of political centralization and economic regional decentralization (Xu, 2011). The highly centralized political structure serves as an instrument for the central government to induce local governments to insert efforts and follow the central government's policies as local government officials are appointed and promoted by the upper-level government (Li and Zhou, 2005; Wang et al., 2020). Many factors come into play in the appointment and promotion process such as the candidate's age, experience, social tie, and political connection (Jia et al., 2015; Jiang, 2018; Fisman et al., 2020). Besides personal characteristics, the performances of the regions managed by local leaders also serve as indicators for their career advancement. It has been largely documented that economic performance measures have been key indicators for promotion (Li and Zhou, 2005; Yao and Zhang, 2015; Xu, 2011; Wang et al., 2020). While economic performance has been an important evaluation target incentivizing local leaders to exert efforts for economic growth, non-economic targets such as environmental sustainability and social stability have gradually become important in the cadre evaluation system (Campante et al., 2023; He et al., 2020).

Employment as an important focus. In 2013, the Central Organization Department issued a notice to reform the performance evaluation system for local officials. This notice emphasized that, in addition to GDP and its growth rate, the evaluation of cadres would prioritize high-quality and sustainable development, with a particular focus on employment (Central Organization Department, 2013).[8] Employment holds significant importance for local leaders for two main reasons. First, employment serves as a key indicator of economic performances, reflecting the local officials' capability to maintain and boost economic activities. Second, high levels of unemployment can threaten social stability, which is crucial for maintaining the regime's legitimacy and the Chinese state has massive investment on maintaining the social stability.[9] Therefore, for local officials, ensuring employment not only meets the economic objectives but also the social stability objective.

On the other hand, economic regional decentralization gives local governments autonomy and overall responsibility to provide public services and initiate and coordinate policies and reforms within their jurisdictions. With the political incentives, local leaders can adopt autonomous tools to reach the political target. For example, state-owned firms are used as a tool of employment provision to prevent social unrest (Wen, 2022); the development of local government financing vehicles (LGFVs) and shadow banking has been used as a financing tool (Chen et al., 2020).

In the rest of the paper, I provide evidence that political centralization incentivizes city leaders to increase construction employment, and regional decentralization grants them the capacity to do so. Specifically, I leverage the institutional feature that grants local governments autonomy in selling land within their jurisdictions to initiate construction projects. This institutional feature of land is introduced in the next section.

2.3 Land Sales in China

In China, the state owns the urban land.[10] The 15th National Congress of the Communist Party of China in 1998 officially granted local governments de jure ownership over land in their geographical jurisdictions. Although the central government largely determines the

[8] In addition to employment, the notice highlighted other factors such as resource conservation, environmental protection, innovation, education, social welfare, and public health.

[9] One example is that the state invested a lot in surveillance and security to prevent the occurrence of social unrest.

[10] The agricultural land is owned by rural collectives. The State can buy land from rural collectives and convert the ownership to the State.

overall amount of land available for sale, local governments retain considerable discretion in deciding the quantity of land to sell and its intended use.

Land sales have been utilized by local governments as a tool for economic development. On the one hand, all revenue generated from land sales is directed into local government budgets. This funding can be used and required to be used in supporting city construction projects, the acquisition of new land, and related compensation for rural people (State Council, 2006). On the other hand, by strategically selling different categories of land, local governments can influence the direction of economic development. For instance, selling industrial land can attract businesses and bolster local industries (Liu and Xiong, 2020), while selling residential land can facilitate the urbanization process (Wang et al., 2020).

3 Data and Empirical Strategy

3.1 Data Sources and Measures

Unit of Analysis. This study focuses on the prefectural level city as the unit of analysis, which is the administrative level below the the province and above the county in China's administrative hierarchy. My sample includes 279 cities, for which data on city characteristics are available. I exclude Beijing, Tianjin, Shanghai, and Chongqing from the sample as they are provincial level cities. Overall, the sample consists of almost all prefectural cities across China except cities in Tibet.

Export Slowdown. The measure of export slowdown are obtained from Campante et al. (2023), with the original data comes from China's General Administration of Customs. The database covers the universe of China's exporters and importers. It provides information on the trading firm's location, trade values at the Harmonized System (HS) six-digit product level, and trade partners. I include 4596 HS6 products in my sample. The exposure to export slowdown is measured using the annual change in the city's exporting values per worker, with more negative value indicating more severe exposure to the export slowdown:

$$\Delta Export_{ct} = \sum_{k} \sum_{f \in c} \frac{\Delta X_{fckt}}{L_{c,2010}} \tag{1}$$

where f denotes firm, c city, k product, and t time. X_{fckt} is the export values of firm f in product k at year t. $\Delta X_{fckt} = X_{fckt} - X_{fck,t-1}$, is the annual change of firm f's export

values. $L_{c,2010}$ is the working-age population (ages 15-64) of the city c in the year 2010, which is obtained from the 2010 Census.

Construction Employment. The city-by-sector-level employment data are obtained from City Statistics Yearbooks, which provide employment data in sectors of manufacturing, construction, mining, energy and utility, and all the various services sectors. The main dependent variable is defined as:

$$\Delta Construction\ Employment_{c,t+1} = \frac{\Delta N_{c,t+1}}{L_{c,2010}} \tag{2}$$

where $N_{c,t+1}$ is the number of construction employment in city c at time $t+1$. $\Delta N_{c,t+1} = N_{c,t+1} - N_{c,t}$ is the annual change of city c's construction employment. $L_{c,2010}$ is the working-age population (ages 15-64) of the city c in the year 2010, which is obtained from the 2010 Census.[11] The interpretation of $\Delta Construction\ Employment_{c,t+1}$ is the change in the share of construction employment in the working-age population.

For other sectors, I construct the employment share measure similar to Equation 2. Specifically, the change in the share of employment in sector i in the working-age population is defined as:

$$\Delta Sector\ i's\ Employment_{i,c,t+1} = \frac{\Delta N_{i,c,t+1}}{L_{c,2010}} \tag{3}$$

where $N_{i,c,t+1}$ is the number of sector i's employment in city c at time $t+1$. $\Delta N_{i,c,t+1} = N_{i,c,t+1} - N_{i,c,t}$ is the annual change of city c's employment in sector i.

Land Sales. Data on land sales come from the website of the Land Transaction Monitoring System (http://www.landchina.com/), which provides records of land transactions from the year 2000 till now. For each land transaction, the Ministry of Land and Resources records the transaction date, location of the land parcel (address and postal code), size, total payment, land usage (e.g., residential, commercial, and industrial), land parcel quality (evaluated by the official-in-charge on a 20-point scale), a three-digit industry code of the buyer's firm, and names of sellers and buyers.

I construct the city-by-year measures of land sales by aggregating the land transactions by city and year. Specifically, the measures of interest are the city-level land sales revenue, land sales area (the size of the land sales), the average selling price per hectare of the land, and these three measures by different land usage types. Specifically, I consider three

[11] The working-age population is only available during the Census years.

usage types of land: residential land, commercial land, and industrial land, as these are the main types of land sold in the land market, accounting for 76.11% of the land transactions during the sample period.

City Leaders' Characteristics. This paper considers city party sectaries as city leaders as they hold the top authority and executive discretion in a city given the leading position of Chinese Communist Party.[12] I collect information on the characteristics and career trajectories of city leaders by compiling data from Yao et al. (2022) and Jiang (2018), which provide information on each official's education, political ranking, birth city, political experiences, and career history.

Auxiliary Data. I use other auxiliary data for controls and mechanism exploration, including city-level time-varying characteristics. Appendix C describes these data.

3.2 Empirical Strategy

This section describes the regression model and identification strategy to identify the effect of export slowdown. To make it brief, in this section I only describe the case of my main outcome – construction employment. The cases of other outcomes are very similar.

3.2.1 Estimating Equation

I regress the city-level construction employment change on the export shock experienced by the city using the following baseline specification:

$$\Delta Construction\ Employment_{c,t+1} = \beta \Delta Export_{ct} + \delta \Delta X_{ct} + \lambda_c + \mu_{pt} + \epsilon_{ct} \tag{4}$$

where c denotes city, p province and t year. $\Delta Export_{ct}$ is the change in city c's manufacturing export per worker between year $t-1$ and year t defined in Equation 1. $\Delta Construction\ Employment_{c,t+1}$ is the change in the share of working-age population employed in the construction sector from t and $t+1$ defined in Equation 2. The one-year gap between the export shocks and the construction employment change is taken to account for the time that the labor market adjustment will take. The X_{ct} includes a series of time-varying city-level characteristics, such as population composition, which includes

[12] Previous literature also regards local party sectaries as local leaders. See, for example, Persson and Zhuravskaya (2016); Campante et al. (2023); Wang et al. (2020).

the share of college students and the share of non-hukou residents.[13] λ_c and μ_{pt} capture city fixed effect and province-year fixed effect.

Note that the regression in Equation 4 uses the first differences of both dependent and independent variables. The first-differencing removes the time-invariant determinants of construction employment share in city c. The city fixed effect captures the possible city characteristics affecting the change of construction employment share, or city-specific linear time trends in construction employment share. The province-year fixed effect controls for province-specific determinants on the change in construction employment share over time. I weight each observation by the city's working-age population in 2010 to make the results more representative and cluster the standard errors by provinces. In Section 4.2, I show that the results are not sensitive to these particular choices of weighting and clustering level.

3.2.2 Instrumental Variable Approach

Using ordinary least-squares estimates to estimate Equation 4 is problematic for the following two reasons. Firstly, it might suffer from reverse causality that a higher construction employment share, i.e., a more developed construction sector, would encourage (discourage) the development of manufacturing firms, which increases (decreases) the change in export values. Secondly, omitted variables can also bias the results that some time-varying unobservable might simultaneously affect the export performances and construction employment.

To address the potential endogeneity concern, I follow Campante et al. (2023) and adopt a shift-share (Bartik) instrument for the export change variable making use of the change in the global trade flows excluding China (referred to as the "rest of the world" or ROW hereafter). The instrument uses the city-level initial export mix across products as the share and the product-level trade flow change in the rest of the world as the shift. Specifically, the IV for $\Delta Export_{ct}$ is constructed as follows:

$$\Delta ExportROW_{ct} = \sum_k \frac{X_{ck,2010}}{\sum_c X_{ck,2010}} \frac{\Delta X_{kt}^{ROW}}{L_{c,2000}} \tag{5}$$

[13]The control variables are obtained from the City Statistical Yearbooks. In some years, some cities have missing values in the control variables. In this instance, missing values are filled with the placeholder value of 999. To account for this imputation, a corresponding dummy variable is created for each control variable, indicating whether the value had been imputed. These dummy variables are then included in the regression alongside the original control variables.

where $\Delta X_{kt}^{ROW} = X_{kt}^{ROW} - X_{k,t-1}^{ROW}$ is the change in product k's trade flows from ROW to ROW between year $t-1$ and t.[14] $\frac{X_{ck,2010}}{\sum_c X_{ck,2010}}$ is the initial city-level export share for product k. The weighted average of the rest of the world's trade shocks across products, $\sum_k \frac{X_{ck,2010}}{\sum_c X_{ck,2010}} \Delta X_{kt}^{ROW}$ is divided by the city-level working-age population in 2000, $L_{c,2000}$, to express the IV as export shock per worker (the unit is 1000 USD). The divided population of $\Delta ExportROW_{ct}$ is chosen in the year 2000 to avoid using the same population denominator of the population in 2010 in $\Delta Export_{ct}$ following Campante et al. (2023).

The validity of the IV in Equation 5 relies on the identification assumptions that (1) conditional on the control of time-varying city characteristics, city fixed effect, and province-year fixed effect, other time-varying city characteristics absorbed in the error term are not correlated with the IV $\Delta ExportROW_{ct}$; (2) there is strong correlation between the IV $\Delta ExportROW_{ct}$ and the key explanatory variable $\Delta Export_{ct}$; and (3) the IV satisfies the exclusion restriction. For (1), Borusyak et al. (2022) establish that the exogeneity assumption holds if the shocks are exogenous, allowing for the endogeneity of the shares. In this case, if the product-level export shocks are not correlated with the error term, the exogeneity assumption is valid. To validate this, I run a balance test recommended by Borusyak et al. (2022) (discussed in Appendix D) and the result indicates that export shocks for the rest of the world can be viewed as good as randomly assigned, which supports the exogeneity assumption. For the relevance assumption (2), the first-stage F statistic and the visualization of first-stage relationship (shown in Figure 2A) support that $\Delta ExportROW_{ct}$ is a strong IV. I assume the hold of exclusion restriction (Assumption (3)). The rationale is that the changing trade flows of different products in the rest of the world are determined by the different recovery speeds of countries after the financial crisis, which is hard for cities in China to predict. Therefore, it is unlikely that the trade flows in the rest of the world would affect the city's construction-related measures through channels other than the export shocks experienced by their cities.

4 Export Slowdown and Construction Employment

4.1 Construction Employment Creation Following Export Slowdown

Before showing the regression results, Figure 2 visualizes two key relationships: the relationships between city-level export changes and the rest-of-the-world export shock IV

[14] The data source is UN Comtrade.

(first stage) and the relationship between the predicted city-level export changes using the IV and construction employment (second stage). The axes variables are residualized to remove the city fixed effect and province-year fixed effect and the export shocks variable is categorized into 50 bins. As shown in Figure 2A, there is a strong positive relationship between $\Delta Export$ and $\Delta ExportROW$, which is consistent with the high F statistic and supports the strong IV argument. Figure 2B presents a statistically significant negative relationship between export changes and construction employment changes that negative export shock is associated with an increase in construction employment. When excluding the top and bottom tail bins of the export shocks, the negative relationship between export changes and construction employment changes still holds.

Table 1 reports the IV regression results based on Equation 4. Columns (1) and (2) present the effect of the export slowdown on employment in the manufacturing sector, which is mostly affected due to its significant role in exports.[15] Specifically, Column (1) presents the effect without including time-varying city-level controls, while Column (2) incorporates these controls. On average, a one-standard-deviation increase in exposure to the export slowdown, which is equivalent to a reduction of $753 in export value per worker, leads to a decrease of 0.64 percentage points in the share of the working-age population employed in the manufacturing sector. However, in the subsequent period, cities more exposed to the export slowdown experienced a rise in construction employment, as evidenced in Columns (3) and (4). This increase in construction employment, amounting to 0.06 percentage points increase (around 2.27% of the average construction employment size) for a one-standard-deviation increase in export slowdown exposure, helps mitigate 9.38% of the employment loss in the manufacturing sector due to the export slowdown.

To examine how employment adjusts across different sectors following the export slowdown, Figure 3 plots the coefficients of $\Delta Export$ for all sectors, except for the agricultural sector, estimated using Equation 4 similarly used in Column (4) of Table 1. Notably, the construction sector is the only sector that experiences an increase in employment following the export slowdown, suggesting its role in buffering negative economic shocks when general employment is adversely affected. Table A2 reports these coefficients of $\Delta Export$ and Figure A1 further examines the impact of export shocks on more granular categories within the service sector. The results confirm the resilience and buffering role of the construction sector during the export slowdown period.

[15] Table A1 presents the immediate employment effects of the export slowdown across different sectors except for the agricultural sector. It shows that export slowdown immediately decreases manufacturing and transportation employment, with manufacturing employment reduction accounting for 95.11% of such employment decline.

4.2 Robustness Checks

I perform a series of robustness checks in this section to validate the result.

Specification Checks. Column (1) of Table A10 first shows that the result remains stable when the regression is unweighted. Column (2) additionally includes the controls of city leaders' characteristics including age, the square term of their age, tenure, and the dummies of their educational degrees. Column (3) uses different construction of the dependent variable. Instead of using the working-age population from the 2010 Census as the base to construct the construction employment share, Column (3) uses the population data obtained from the CSY as the base to construct the construction employment share. The result remains robust across different specifications.

Influential Observations. To check if the result is driven by any specific province or any specific industry, I leave out a province and an HS section at a time and re-estimate Equation 4. Figure A2 plots coefficients of interest when each province is dropped from the sample and Figure A3 plots coefficients of interest when each HS section is dropped when constructing the export shock variable and the SSIV variable. The estimate is stable and remains negative and statistically significant to the exclusion of any province and any HS section, suggesting the result is not driven by any outlier of industry or province.

Alternative Inferences. Finally, I check whether the result is robust by clustering the standard errors at several alternative levels. Column (1) in Table A11 reports the result clustered at the provincial level. Column (1) also reports the 95% confidence interval based on the wild cluster bootstrap-t procedure recommended by Cameron et al. (2008) in the concern of the small number of clusters that my sample has 26 provinces.[16] I also implement the "tF inference" for IV proposed by Lee et al. (2022) to confirm the statistical significance of the IV estimate. The tF confidence intervals are reported at the bottom of Column (1). Column (2) in Table A11 clusters the standard error at the city level to allow for the within-city and across-year correlation.

As pointed out by Adao et al. (2019), the regression residuals in the shift-share specification would be correlated across regions with similar sectoral composition, regardless of their geographic proximity, in the presence of unobserved sectoral shifts. As a consequence, clustering standard errors at the geographic unit level will lead to over-rejection of the null hypothesis. To address this concern, I follow Campante et al.

[16] Beijing, Shanghai, Tianjin and Chongqing are excluded in my main sample as these four are provincial cities.

(2023) and use alternative clusters based on the similarity of the city's export structure.[17] Following Campante et al. (2023), the city-level similarity index takes the following form:

$$SimilarityIndex_{c,j}^{ROW} = \sum_{k} min\{\frac{X_{ck}^{ROW}}{X_{c}^{ROW}}, \frac{X_{jk}^{ROW}}{X_{j}^{ROW}}\} \tag{6}$$

where $\frac{X_{ck}^{ROW}}{X_{c}^{ROW}}$ is export share of product k in city c's total exports. The index is constructed using the provincial capital cities as the reference group, with j denoting the provincial capital city. The index takes a value between 0 and 1, with 0 denoting the two cities having no similarity in their export structure. In Column (3), the cluster group is created by assigning each city to the group of the provincial capital city that is most similar to it. In Column (4), the cluster group is created by assigning each city to the group of the provincial capital city that is outside its province and most similar to it. The baseline result remains robust to these alternative clustering choices.

4.3 Political Effect of Construction Employment Creation

Job creation is a key priority for the government's agenda, particularly during economic downturn. In a democracy, rising unemployment tends to harm incumbents (Garz and Martin, 2021) and existing literature document a phenomena of "political employment cycle", where employment levels increase prior to elections (Levitt, 2002; Mechtel and Potrafke, 2013; Cahan, 2019). Employment also plays a critical role in authoritarian regimes, as high unemployment can lead to social unrest, posing a threat to regime stability. In the context of China, urban employment has been an important performance indicator in the cadre evaluation system. This section investigates the role of construction employment creation on city leaders' career.

China's political system has a well-defined administrative hierarchy of positions. Specifically for city leaders, their political ranks can ascend from prefecture to deputy-provincial, provincial, and politburo levels. Typically, city leaders serve five-year terms in an office, although most city leaders having their terms shorter than five years in a city. After their current term, city leaders generally follow one of the three career paths depending on their performance evaluated by their upper-level government. The first path is promotion, where city leaders advance to higher political ranks. The second path is a lateral move, where city leaders transit to positions of the same political rank. The third

[17] Note that the standard-error correction approach proposed in Adao et al. (2019) cannot be applied in my context since the number of products is far larger than the number of cities.

outcome is retirement or career termination, often due to corruption or other political issues. Notably, no city leaders in the sample period experienced demotion to lower-ranking positions. In this section, I focus on the career outcome of promotion. In the data, I define promotion as a binary variable, with a value of 1 indicating that the city leader's subsequent position has a higher political rank compared to their current one.[18] I also exclude the positions in the Chinese People's Political Consultative Conference (CPPCC) or the People's Congress (PC) from the definition of promotion, as these positions carry no real power and signify semi-retirement.[19]

I collect information on the characteristics and career trajectories of city leaders by compiling data from Yao et al. (2022) and Jiang (2018). In my sample, there are 455 individuals who have held a position as a city leader between years 2013 and 2016. Among those who experienced a career transition, 22.35% of the career transitions were promotions, and 48.04% of the career transitions were lateral movements.

To examine how urban construction employment creation during the export slowdown period affects city leaders' promotion, I estimate the following regression model:

$$Promotion_{i,c,t+1} = \beta \Delta Construction_{ct} + \Gamma X_{ct} + \Theta W_{it} + \lambda_c + \mu_{pt} + \epsilon_{ict} \tag{7}$$

where $Promotion_{i,c,t+1}$ is a binary variable, which equals 1 if city leader i in city c is promoted in year $t+1$. The independent variables include a series of variables of city performance at time t, where $\Delta Construction_{ct}$ represents the change in construction employment defined in Equation 2. The model also further controls for time-varying city-level characteristics, including the export slowdown exposure, city's GDP, GDP growth rate, city government's revenue and expenditure, population growth rate, and changes in the share of hukou (local resident) population. In addition, I also add city leaders' individual controls, including city leader's age, the square of age, education level, and their tenure in the current office. With these controls, β captures the effect of construction job creation on the city leader's political career outcomes, conditional on the city and city leader characteristics, city fixed effects, and province by year fixed effects.

Table 2 presents the political effect of construction employment creation. The results show that higher construction employment during the export slowdown period is associated with a greater likelihood of city leaders being promoted. Specifically, a

[18] An example will be a prefecture-level city leader who gets a position at the deputy-provincial or higher position.

[19] Wang et al. (2020) also exclude these positions when defining promotion.

one-percentage-point increase in the share of the working-age population employed in the construction sector corresponds to approximately a 1% higher probability of being promoted to a higher-ranking political position. While exposure to the export slowdown does not directly affect city leaders' promotion (as shown in Column (2) of Table 2),[20] experiencing the same exposure to the export slowdown, leaders whose cities create more construction jobs are more likely to be promoted. This positive career return on construction employment creation suggests that construction employment during the export slowdown period serves as a signal of city leaders' efforts and capability in managing negative shocks. Leaders who manage to boost construction employment during periods when overall employment is adversely affected by the shocks are politically rewarded.

One concern is that the effect of construction employment creation on city leaders' promotion is driven by other unobserved characteristics. Although Equation 7 includes several relevant controls, including the level and growth rate of GDP, government revenue and government expenditure, there can still be confounding unobservables. To access the extent to which such omitted variables are driving the result, I conduct the sensitivity test developed by Oster (2019). The result is presented in Table A3. When including additional city-level economic controls, the coefficient of construction employment creation remains relatively unchanged despite a larger change in the R^2. The δ statistic reported in the table suggests that the unobservables have only limited scope to explain the effect of construction employment creation on city leaders' promotion.[21] Overall, the findings highlight the political benefits of boosting construction employment during the economic downturn, as city leaders who mitigate the impact of export slowdown by creating more jobs in the construction sector are more likely to advance in their careers.

The positive career impact of creating construction jobs for city leaders suggests that city leaders with stronger career incentives are more likely to put more efforts to create construction employment. To test this hypothesis, I construct two measures of city leaders' career incentives. The first measure, $Age < 57$, is a binary variable equal to one if the city leader is younger than 57 years old. This measure of career incentives is based on the

[20]The null effect of export slowdown on city leaders' promotion probabilities reported in Column (2) is consistent with the findings of Campante et al. (2023), who show that export slowdowns do not affect city leaders' promotion but do increase their probability of being lateral moved. Their findings highlight that the central government uses export shocks to screen incapable officials and this screening could incentivize the officials to exert efforts to deal with the negative shocks.

[21]The δ statistic by Oster (2019) is 2.554, suggesting that the selection on unobservables should be at least 2.554 times of the selection on observables to explain away the effect of construction employment creation on promotion ($\beta = 0$). A value of $|\delta| > 1$ typically suggests the robustness of the results.

fact that the mandated retirement age for city leaders is 60 and the maximum promotion-eligible age is around 57 (Kou and Tsai, 2014).[22] Therefore, city leaders younger than 57 years old have greater career prospects and are expected to have stronger incentives to boost construction employment during the export slowdown period. The second measure, *Politically connected*, leverages political connections of city leaders based on patronage ties. Following Jiang (2018), patronage ties are identified using city leaders' past promotions. Specifically, the patron of city leader i is defined as the provincial party sectary who first promoted i to a city leadership position. If i's patron holds a provincial leadership position in the same province in which the current city i manages is, then i is defined as politically connected, with *Politically connected* equal to one. Since patronage ties can motivate leaders to perform well in order to maintain their patron-client relationship and secure rewards, city leaders with political connections are expected to have stronger incentives to increase construction employment during the export slowdown period.

Table 3 tests these two hypotheses by conducting a heterogeneity analysis, comparing the effect of export slowdown on construction employment creation in cities led by leaders with higher versus lower career incentives using the above two measures. Columns (1) and (2) present the result using city leaders' ages as a measure of career incentives. The finding shows that export slowdown in general leads to an increase in the cities' construction employment, and this effect is especially strong in cities with leaders younger than 57 years old, who have higher career prospects. The increase in the construction employment share in cities managed by young leaders is almost twice as large as the average increase in construction employment across all leaders when experiencing an export slowdown. This is consistent with the hypothesis that city leaders with stronger career incentives would insert more efforts to boost the construction jobs as doing so increases their probabilities to get promoted. Columns (3) and (4) examine whether the response to the export shock in terms of construction job creation differs between cities with leaders who are politically connected and those who are not. The negative coefficient of the interaction term $\Delta Export \times Politically\ connected$ suggests that city leaders with patronage ties to provincial leaders create even more construction jobs. Specifically, the increase in the construction employment share in cities managed by politically connected leaders is almost three times as large as the average increase in construction employment across all leaders when experiencing an export slowdown. This finding aligns with Jiang (2018), who show that city leaders with patronage ties to current provincial leaders deliver significantly faster economic growth than those without such ties. Carefully note that the

[22] Age 57 is also used as a cut-off for city leaders' career prospects in Campante et al. (2023) and Jiang (2018).

larger impact of export slowdowns on construction employment in cities with politically connected leaders could also be due to the greater resources these leaders can leverage to boost construction projects. Unfortunately, this paper cannot disentangle the portion of the effect attributable to potentially more resources brought by patronage ties.

5 Strategy and Consequences of Construction Employment Creation

5.1 How the Construction Jobs are Created?

A natural question following the finding of increasing construction jobs after the export slowdown is what leads to the increase of construction jobs? In this section, I provide one potential strategy city governments use to boost construction employment by leveraging the institutional feature that city governments are monopolists in the city land markets.

Government land sales can stimulate construction employment through the following two channels, as illustrated in Figure 4. Firstly, city governments can sell land intended for real estate development, enabling real estate developers to purchase the land and initiate housing construction projects. Secondly, the revenue obtained from land sales can be leveraged to finance city infrastructure projects, which directly create construction jobs. It is important to note that while city governments may allocate land sales revenue to various expenditures, they are legally required to use these funds specifically for land-related and compensation-related expenditures such as land acquisition and city construction projects (State Council, 2006). In practice, it is well-documented that Chinese cities primarily finance their urban infrastructure using land sales revenue (Cai et al., 2013). Therefore, an increase in land sales revenue provides cities with greater capacity to build infrastructure projects.

To examine whether land sales serve as a mechanism that increases construction employment, Table 4 reports the effect of export slowdown on land sales. Column (1) in Panel A shows that cities more exposed to the export slowdown have higher land sales revenue. On average, a one-standard-deviation increase in exposure to the export slowdown increases the land sales revenue by 6.25 percent. Unpacking the increase in revenue into the area of land sold and the selling price of the land, Columns (2) and (3) show that the increased land sales revenue is driven by more area sales of the land. Panel B, C, D further decompose the land sales into different usage types. More sales

of residential and commercial land, which are intended for real estate development, are driving the increase in the total land sales revenue. There is no impact of export slowdown on industrial land sales.

After presenting the effect on increased sales of residential and commercial land, Table 5 presents evidence supporting the above two channels through which land sales contribute to construction job creation. Columns (1) and (2) show that cities more exposed to the export slowdown have higher real estate investment, which is an indirect measure of real estate construction projects. This increase in real estate investment reflects the activity of real estate developers who are expected to construct housing projects on the purchased land. Columns (3) and (4) show that these cities more exposed to the export slowdown also experience an increase in constructed roads in the subsequent period, a measure of infrastructure projects. Together, these increases in housing and infrastructure projects provide sources for employment growth in the construction sector.

In the Appendix Section E.2, I show that the results of land sales and construction projects are robust using different samples and different inference methods, confirming that land sales serve as one strategy city governments use to create construction employment.

5.2 Longer-term Effects of Land Sales

So far, I have established that city governments strategically utilize land sales to increase construction employment as a response to negative export shocks. Furthermore, the creation of construction employment is beneficial for city leaders' career trajectories, signaling their efforts and capability to manage negative shocks. However, what are the longer-term effects of using land sales to boost construction employment?

One major concern is that government incentives leading to increased sales of residential and commercial land may cause the supply of residential and commercial housing to exceed the actual market demand. This supply-demand mismatch could result in a surplus of unsold properties, representing an inefficiency in resource allocation. Moreover, if real estate developers rely heavily on debt financing for land acquisitions and subsequent housing construction activities, governments' push towards residential and commercial land sales may result in high leverage for these developers, which increases their risk of financial distress. This scenario could further destabilize the real estate market, even further leading to instability in the global economy.

I examine these potential longer-term consequences, specifically the oversupply of housing and elevated real estate risk. To measure the oversupply of housing, I use the city-level data of residential floor space waiting to be sold, obtained from Rogoff and Yang (2024). A high volume of unsold residential floor space indicates an oversupply of housing. To measure real estate risk, I leverage the context of the central government's regulations on debt levels among real estate developers since 2020. For years, real estate developers have had relatively easy access to credit. However, in 2020, the Chinese central government imposed strict measures to curtail reckless borrowing practices, compelling developers to decrease their debt levels before accruing more (Economic Daily, 2021). This regulation, along with the sluggish housing demand during the COVID period, triggered a liquidity crisis for many firms that relied on debt to sustain ongoing construction projects. With many apartments being presold,[23] the financial strain led to numerous unfinished but sold housing projects, provoking collective protests from homeowners who needed to pay mortgages on the unfinished apartments. I measure real estate risk using the incidence of homeowners' collective protests against paying mortgages on unfinished apartments, leveraging data from a crowdsourced list titled "WeNeedHome" on GitHub.[24] This repository collects information on properties where collectives of homeowners have initiated or threatened to request a loan suspension for their mortgages on the unfinished apartments. As of the data retrieved in 2023, the list includes 348 properties across 94 cities in China where homeowners have taken collective loan suspension for unfinished housing protests. I construct a binary variable at the city level, with one denoting the presence of at least one property in the city experienced homeowners' protests for unfinished housing, serving as a proxy for the city-level real estate risk.

To examine how land sales during the export slowdown affect the housing oversupply and real estate risk, I estimate the following two regressions:

$$\Delta WaitingFloor_{c,p,13-19} = \beta \Delta LandRevenue_{c,13-16} + \Gamma X_{c,10} + \lambda_p + \epsilon_c \tag{8}$$

$$Protest_{c,p} = \beta AverageLandRevenue_{c,13-16} + \Gamma X_{c,10} + \lambda_p + \epsilon_c \tag{9}$$

where c denotes city and p denotes province. Equation 8 uses a long-difference specification, with $\Delta LandRevenue_{c,13-16}$ representing the cumulative change in logged land sales revenue in city c between year 2013 and 2016, which marks the period of export slowdown. $\Delta WaitingFloor_{c,p,13-19}$ is the change in logged volumes of residential floor

[23] According to The New York Times (2022), about 90 percent of new homes in China were "presold."

[24] The GitHub page can be found in https://github.com/WeNeedHome/SummaryOfLoanSuspension. The data used is retrieved in September, 2023.

space waiting to be sold in city c from year 2013 to 2019, providing a long-difference perspective from the onset of the slowdown period to the latest data point before the COVID-19 pandemic. Equation 9 uses a cross-sectional regression with $Protest_{c,p}$ being a binary variable with 1 indicating city c has experienced at least one instance of homeowners' collective protests against unfinished housings following the regulations on real estate firms' debt level since 2020. $AverageLandRevenue_{c,13-16}$ is the average land sales revenue between 2013 and 2016. λ_p denotes the province fixed effect, and standard errors are clustered at the province level.

To address potential confounding factors that might simultaneously drive land sales during the export slowdown and the outcomes of interest, I add a series of baseline controls from the year 2010 $X_{c,10}$, including population structure, land sales, housing prices, and economic conditions.[25] Specifically, population controls include variables such as the city-level male-to-female ratio, average age, the proportion of the population aged between 15 and 39, the proportion of the population with local household registration (hukou), and the share of college students. These controls help mitigate biases related to demographic-driven housing demand differences, such as marriage market competitiveness (Wei and Zhang, 2011). Additionally, baseline variables such as land sales revenue, government dependency on land sales,[26] housing prices, GDP, and GDP growth rate are included to control for pre-existing fiscal and economic conditions that could influence housing oversupply and real estate risk. For Equation 9, I further include controls of the share of the Internet users and mobile phone users as these factors are determinants of organized protests and might be correlated with governments' behaviors. Province fixed effects and the tier of the city are also controlled. With these controls, β captures the impact of land sales revenue during the export slowdown on cities with comparable demographic and economic baselines. However, it is important to acknowledge that the analysis may still be subject to bias due to unobserved confounding variables. I discuss it accordingly when presenting the results.

Columns (1) and (2) in Table 6 show that cities with higher land sales revenue during the export slowdown period also have larger volumes of residential floor space awaiting sale. This suggests an oversupply in these cities' housing markets, with one percentage increase in the land sales revenue associated with a 0.253 percentage increase in the column of residential floor space awaiting sale. One concern is that the impact of the land sales on residential floor space waiting to be sold is driven by some unobserved characteristics. I

[25]The year 2010 is chosen for data availability from the 2010 Census.

[26]The land sales dependence is measured as the ratio of land sales revenue and general public budgetary revenue.

conduct two checks to test this concern. Table A4 examines the impact of land sales during the export slowdown period on the pre-slowdown residential floor space to be sold.[27] The underlying idea is that if there is any pre-determined trend comoving the land sales and the residential floor space to be sold, one shall expect there is an effect of land sales during the export slowdown on pre-slowdown residential floor space waiting to be sold. The null effect presented in Table A4 alleviates the concern of the pre-trend driving the result. I also report the δ statistic following Oster (2019). Table A5 suggests a limited scope that unobervables are driving the result.

Columns (3) and (4) in Table 6 further show that cities with higher average land sales revenue during the export slowdown period also face a higher likelihood of homeowners' protests over unfinished housing. As the protest variable is collected based on online information, one concern is that there might be differences in the reporting of local events for cities experiencing different levels of export shocks and selling different levels of land. To address this concern, I use the number of general events reported in GDELT to measure the city-level reporting of local events.[28] The result is presented in Column (2) of Table A6. The effect remains robust when controlling the local reporting of social events. The δ statistic following Oster (2019) is also reported in Table A6, suggesting a limited scope that other unobservables are driving the effect of land sales during the export slowdown period on homeowners' protests. Overall, the longer-term effect suggests a cost of using land sales as a strategy to respond to the export slowdown.

6 Concluding Remark

This paper studies how city governments in China use the construction sector to mitigate employment losses due to negative export shocks. Cities exposed to export slowdown experienced an increase in construction employment. And this increase is especially prominent in cities led by leaders with stronger career incentives, as more construction employment creation is associated with a higher probability of promotion. One mechanism for governments to create construction employment is through selling land intended for real estate development. However, in the longer term, these land sales during the export

[27] I examine the period of 2010-2012 and 2011-2012. Years before 2010 are not included due to very limited data.

[28] Global Database of Events, Language, and Tone (GDELT) is a commonly-used database on global events, especially on social unrest (Cantoni et al., 2024).

slowdown period are associated with the housing oversupply problem and higher real estate risks.

While the creation of construction employment helps mitigate the employment loss during the downturn, the longer-term result in this paper points to an inefficiency brought by the development directives during the downturn that overinvests in real estate projects. This underscores the potential myopic policymaking that is often driven by politicians' career incentives, such as reelection incentives in democracy, leading to policies that provide immediate benefits despite their long-run efficacy. Such "myopic policymaking" is common in both democracy and autocracy, sometimes resulting in long-term problems related to environmental damage, resource depletion, underinvestment in education, accumulation of public debt, etc.

I conclude this paper by noting some limitations. First, land sales may not be the only strategy Chinese city governments use to boost construction employment during economic downturns, and there might also be motives beyond employment creation driving these land sales. It will be interesting for future research to examine different drivers of land sales and their contributions to China's current real estate crisis. Second, the generalizability of this paper's findings may be limited. The mechanism for increasing construction employment discussed in the paper stems from China's institutional feature that local governments own the land and have the autonomy to decide the amount and type of land to sell. This institutional feature enables their capacity to boost real estate and construction projects, which is linked to longer-term real estate problems. The strategy and the longer-term implications in other contexts may be different.

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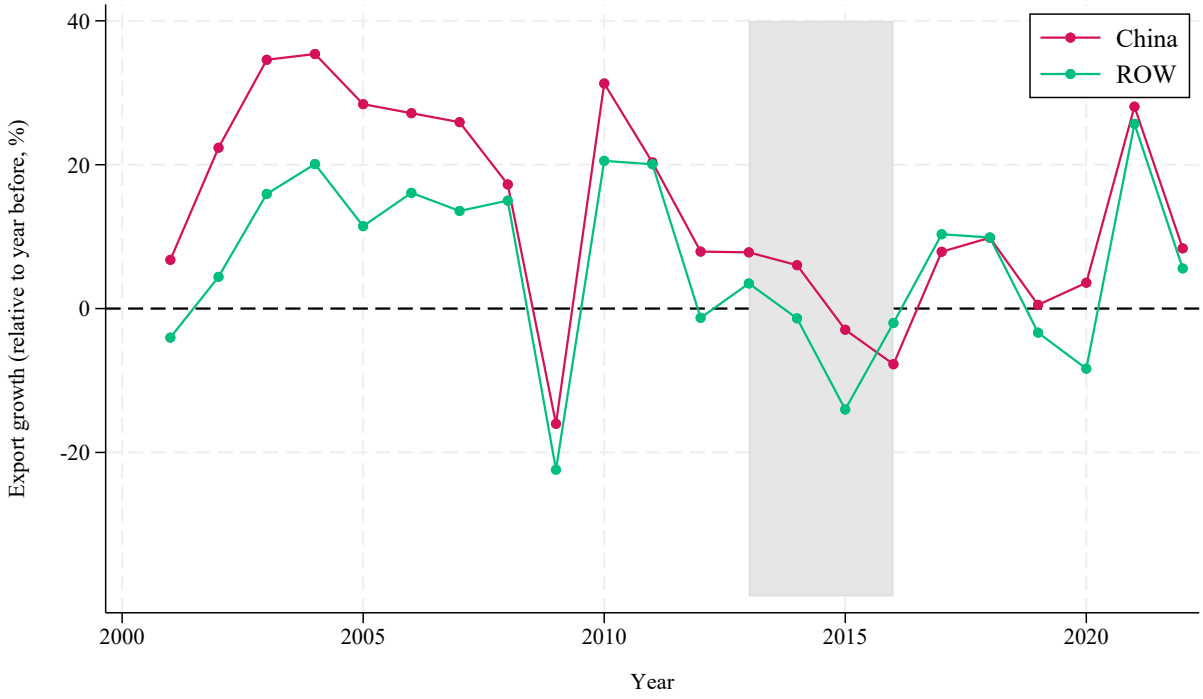
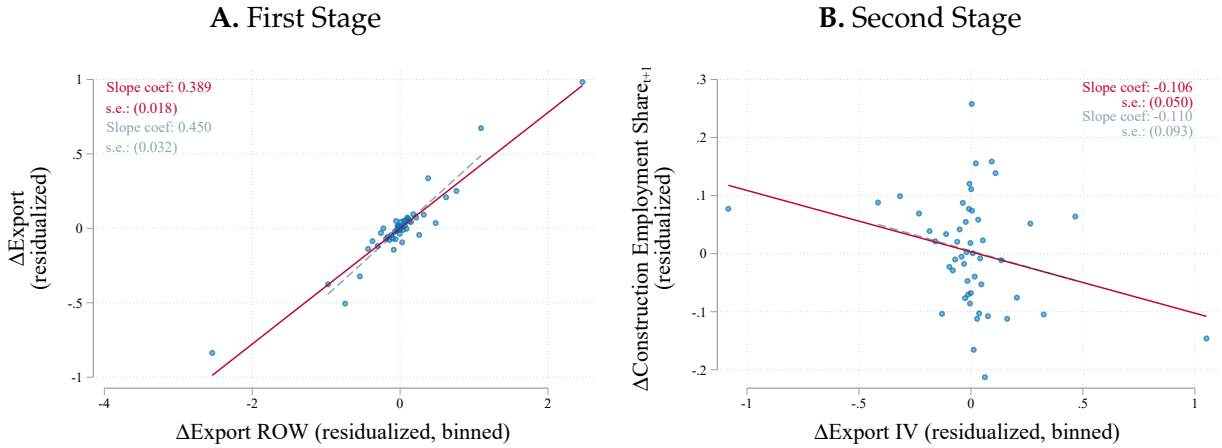
Figures

Figure 1. China's export growth (2001-2021)



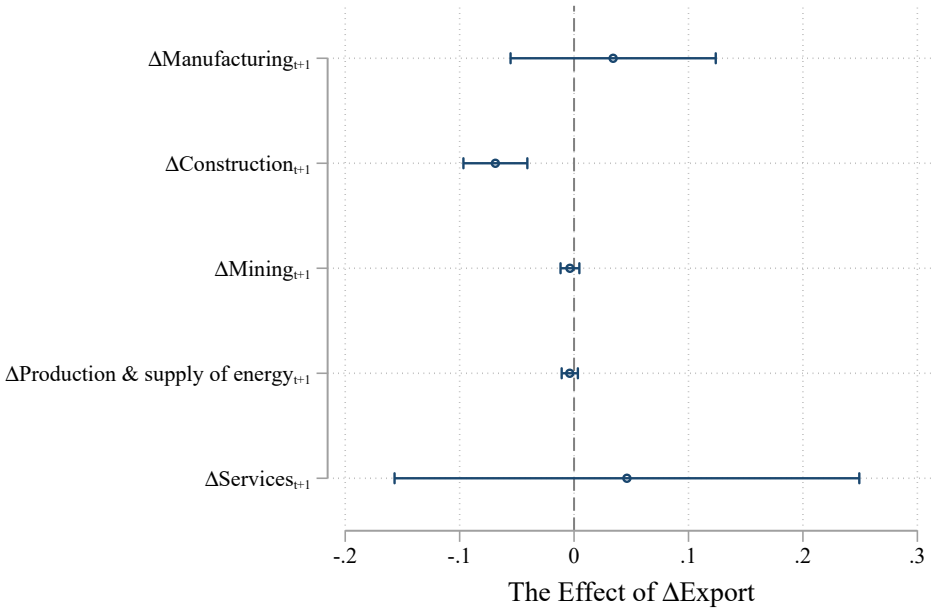
Data from *UN Comtrade*.

Figure 2. Binned Scatter Plot: City Export Shocks and Construction Employment



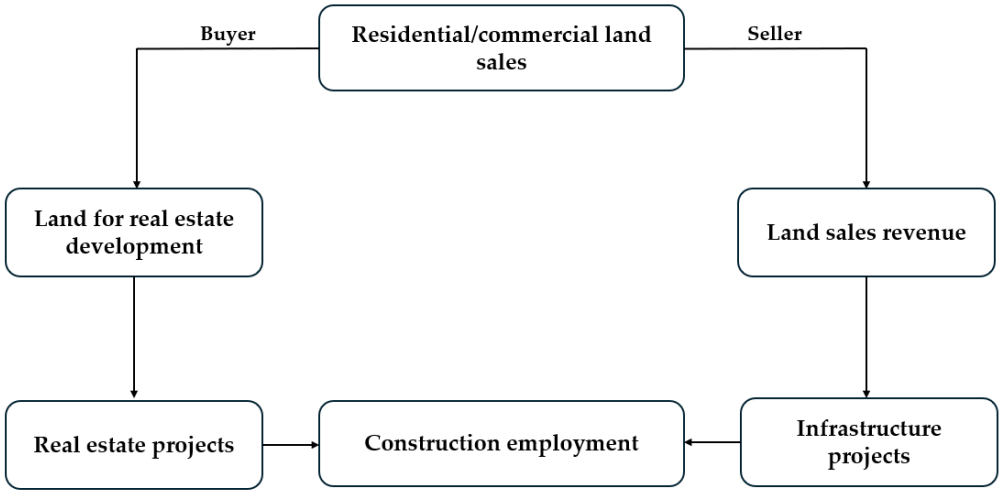
Notes: All variables are residualized to remove the contribution of city fixed effect and province-year fixed effect. The export shock variable is categorized into 50 bins. The solid line fits all binned categories and the dashed line fits the binned categories excluding the top and bottom 2% of the sample.

Figure 3. Export Shocks and Employment



Notes: This figure plots coefficients of export shock in the IV regression of change in employment share on export shock. The confidence intervals are at 95% level.

Figure 4. Conceptual Figure



Notes: This figure illustrates how government land sales can create construction employment.

Tables

Table 1. Export Shocks and Construction Employment

	ΔManufacturing Employment$_t$		ΔConstruction Employment$_{t+1}$	
	(1)	(2)	(3)	(4)
ΔExport	0.857***	0.855***	-0.069***	-0.069***
	(0.222)	(0.212)	(0.013)	(0.014)
City Controls	N	Y	N	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
First-stage F stat	106.470	112.914	106.393	112.904
Mean(%)	4.652	4.652	2.648	2.648
Observations	1121	1121	1123	1123

The dependent variable is the change in the manufacturing employment between year $t-1$ and t (columns (1) and (2)) and the change in the construction employment between year t and $t+1$. Employment is defined as the ratio of total employed workers in the sector and city's working-age population. The key independent variable is the change in export values between year $t-1$ and t, normalized by the city's working-age population. The city controls include the changes in log college graduates and log urban population. All columns report the IV regression result and are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 2. Political Outcomes of Construction Employment Creation

	Promoted$_{t+1}$	
	(1)	(2)
ΔConstruction	0.013***	0.014***
	(0.004)	(0.005)
ΔExportROW		0.008
		(0.014)
CPS Controls	Y	Y
City Controls	Y	Y
Province-year FE	Y	Y
City FE	Y	Y
Mean	0.077	0.077
Observations	1041	1041

The dependent variable in Columns (1) and (2) is a dummy variable equal to one if the city leader is promoted in year $t+1$. The city leader control (CPS control) variables include the city leader's age, the square term of age, educational level dummies, and their tenure. The city controls are controls included in the baseline specification and city performance controls including the level and growth rate of GDP, GDP growth rate, the level and growth rate of the city government's general revenue and expenditure. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 3. Heterogeneity of Construction Employment Creation

	ΔConstruction Employment$_{t+1}$			
	(1)	(2)	(3)	(4)
ΔExport	-0.088***	-0.111**	-0.193***	-0.211**
	(0.029)	(0.046)	(0.059)	(0.081)
ΔExport $\times$ Age $<$ 57	-0.083**	-0.117**		
	(0.040)	(0.055)		
Age $<$ 57	0.086	0.011		
	(0.066)	(0.164)		
ΔExport $\times$ Politically connected			-0.432**	-0.495**
			(0.171)	(0.232)
Politically connected			-0.004	-0.026
			(0.067)	(0.085)
CPS Controls	N	Y	N	Y
City Controls	N	Y	N	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
First-stage F stat	149.833	108.022	8.750	16.440
Observations	1123	1047	1123	1047

The dependent variable in columns (1) - (4) is the change in construction employment share between year t and year $t+1$. *Age* $<$ 57 is a dummy variable (demeaned) if the city leader is younger than 57 in year t. *Politically connected* is a dummy variable (demeaned) if the city leader is connected to the provincial leader in year t. The city leader control (CPS control) variables include the city leader's age, the square term of age, educational level dummies, and their tenure. The city controls are controls included in specification 4. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 4. Export Shocks and Land Sales

	(1) ΔRevenue	(2) ΔArea	(3) ΔPrice
A: Total			
ΔExport	-0.083***	-0.043**	-0.040
	(0.021)	(0.017)	(0.024)
B: Residential land			
ΔExport	-0.079***	-0.038**	-0.041
	(0.022)	(0.017)	(0.030)
C: Commercial land			
ΔExport	-0.191***	-0.064**	-0.127
	(0.063)	(0.025)	(0.079)
D: Industrial land			
ΔExport	0.030	0.000	0.030
	(0.037)	(0.035)	(0.025)
CPS Controls	Y	Y	Y
City Controls	Y	Y	Y
Province-year FE	Y	Y	Y
City FE	Y	Y	Y
First-stage F stat	86.831	86.831	86.831
Observations	1187	1187	1187

The dependent variables are change in logged land sales revenue (Column (1)), change in logged land sales area (Column (2)), and change in logged land sales price (Column (3)) for general land (Panel A), residential land (Panel B), commercial land (Panel C), and industrial land (Panel D). All columns report the IV regression results and are weighted by the city's working-age population in 2010. All regressions control city time-varying characteristics including changes in log college graduates and changes in log urban population, CPS controls, including city leader's age, square term of age, educational dummies, and tenure, city fixed effect, and province-year fixed effect. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 5. Export Shocks and Construction Projects

	ΔReal Estate Investment$_t$		ΔConstructed Road$_{t+1}$	
	(1)	(2)	(3)	(4)
ΔExport	-0.025***	-0.025***	-0.035***	-0.036***
	(0.008)	(0.009)	(0.006)	(0.006)
City Controls	N	Y	N	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
First-stage F stat	106.443	112.876	101.738	104.516
Observations	1118	1118	1069	1069

The dependent variable is the change in the logged real estate investment between year $t-1$ and t (columns (1) and (2)) and the change in the logged constructed road between year t and $t+1$ (The lagged period is chosen to account for the construction time). The key independent variable is the change in export values between year $t-1$ and t. The city controls include the changes in log college graduates and log urban population. All columns report the IV regression result and are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 6. Longer-term Effect of Land Sales

	ΔWaiting Floor		Homeowners' Protests	
	(1)	(2)	(3)	(4)
ΔLand revenue	0.146***	0.253***		
	(0.001)	(0.038)		
Land revenue			0.491***	0.269***
			(0.036)	(0.093)
City Controls	N	Y	N	Y
Province FE	Y	Y	Y	Y
Observations	86	84	327	270

The dependent variable is the change in the logged residential floor waiting to be sold between year 2013 and 2019 (Columns (1) and (2)) and the binary variable of city's occurrence of homeowners' protests over unfinished buildings with data retrieved in 2022. (Columns (3) and (4)). Columns (1) and (2) use the long-difference specification with the key independent variables being the cumulative change in land sales revenue during the export slowdown period (between the year 2013 and 2016). The key independent variables in Columns (3) and (4) are average land sales revenue from year 2013 to 2016. The city controls include the baseline population structural (male-to-female ratio, share of hukou population, share of college students, average age, the share of population aged between 15 and 39), land sales revenue, government dependency on land sales, housing prices, GDP, GDP growth rate, and the tier of the city. For columns (3) and (4), I add additional controls of baseline shares of Internet users and mobile phone users. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.

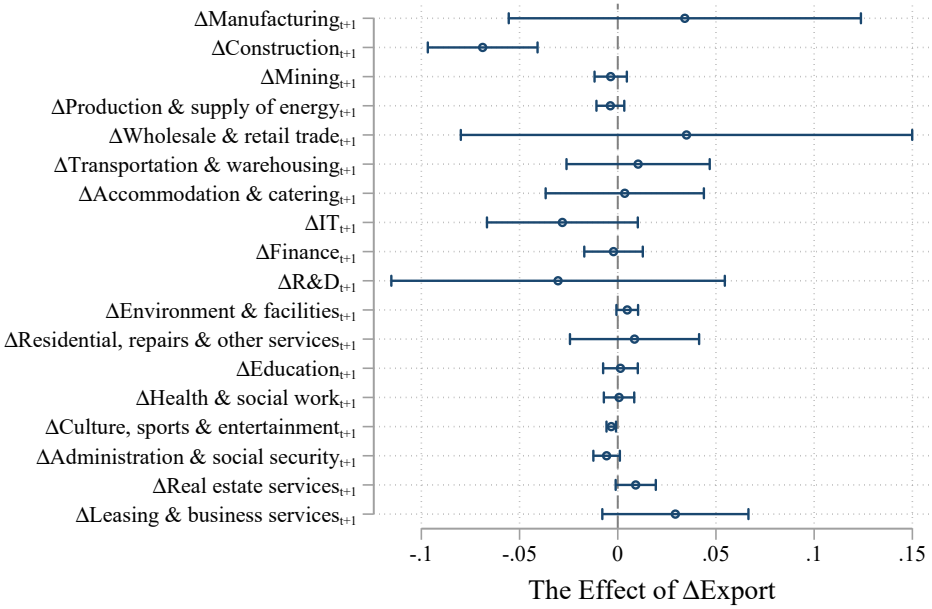
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Online Appendices

Contents

A Additional Figures

Figure A1. Export Shocks and Employment



Notes: This figure plots coefficients of export shock in the IV regression of change in employment share on export shock. The confidence intervals are at 95% level.

B Additional Tables

Table A1. Export Shocks and Employment in the Current Period

	ΔEmployment$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
	Manufacturing	Construction	Mining	Energy	Transportation	Services
ΔExport	0.855***	-0.194	-0.011	-0.001	0.044*	-0.020
	(0.212)	(0.177)	(0.011)	(0.003)	(0.025)	(0.207)
City Controls	Y	Y	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y	Y	Y
City FE	Y	Y	Y	Y	Y	Y
First-stage F stat	112.914	112.914	105.460	112.914	112.914	112.589
Mean	5	3	1	0	1	8
Observations	1121	1121	1017	1121	1121	1136

The dependent variable is the change in the employment between year $t-1$ and t in (1) the manufacturing sector, (2) the construction sector, (3) the mining sector, (4) the energy and utility sector, (5) the transportation sector, and (6) services sectors. Employment is defined as the ratio of total employed workers in the sector and the city's working-age population. The key independent variable is the change in export values between year $t-1$ and t. The city controls include the changes in log college graduates and log urban population. All columns report the IV regression result and all regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A2. Export Shocks and Employment in the Next Period

	ΔEmployment$_{t+1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
	Manufacturing	Construction	Mining	Energy	Transportation	Services
ΔExport	0.034	-0.069***	-0.004	-0.004	0.010	0.046
	(0.044)	(0.014)	(0.004)	(0.003)	(0.018)	(0.099)
City Controls	Y	Y	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y	Y	Y
City FE	Y	Y	Y	Y	Y	Y
First-stage F stat	112.904	112.904	67.526	112.904	112.904	112.589
Mean(%)	4.651	2.648	1.017	0.385	0.642	8.093
Observations	1123	1123	1025	1123	1123	1136

The dependent variable is the change in the employment between year t and $t+1$ in (1) the manufacturing sector, (2) the construction sector, (3) the mining sector, (4) the energy and utility sector, (5) the transportation sector, and (6) services sectors. Employment is defined as the ratio of total employed workers in the sector and the city's working-age population. The key independent variable is the change in export values between year $t-1$ and t. The city controls include the changes in log college graduates and log urban population. All columns report the IV regression result and all regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A3. Political Outcomes of Construction Employment Creation

	Promoted_{t+1}	
	(1)	(2)
ΔConstruction	0.012*	0.014***
	(0.006)	(0.005)
ΔExportROW		0.008
		(0.014)
GDP growth rate		0.003
		(0.005)
GDP		0.000
		(0.000)
Government revenue		0.007
		(0.083)
Government expenditure		-0.194**
		(0.084)
Government revenue growth rate		-0.047
		(0.062)
Government expenditure growth rate		0.149***
		(0.042)
CPS Controls	Y	Y
City Controls	N	Y
Province-year FE	Y	Y
City FE	N	Y
Mean	0.077	0.077
R^2	0.127	0.380
Observations	1041	1041
Oster's δ		2.554

The dependent variable in column (1) is a dummy variable equal to one if the city leader gets promoted in year $t+1$. The dependent variable in column (2) is a dummy equal to one if the city leader is laterally moved in year $t+1$. The city leader control (CPS control) variables include the city leader's age, the square term of age, educational level dummies, and their tenure. The city controls are those included in the baseline specification. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level. The bottom row reports the δ statistic developed by Oster (2019), the value of which indicates how much more the selection on unobservables than on observables should be to explain away the effect of construction employment creation on promotion ($\beta = 0$).
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A4. Pre-trend Check: Land Sales and Housing Oversupply

	(1)	(2)
	ΔWaiting Floor$_{10-12}$	ΔWaiting Floor$_{11-12}$
ΔLand revenue	0.062	-0.004
	(0.055)	(0.043)
City Controls	Y	Y
Province FE	Y	Y
Observations	74	74

The dependent variables in Column (1) and (2) are the change in the logged residential floor space waiting to be sold between year 2010 and 2012, and between year 2011 and 2012. The key independent variable is the change in export values during the export slowdown period (between the year 2013 and 2016). The city controls include controls in specification 8. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A5. Longer-term Effect of Land Sales on Housing Oversupply

	ΔWaiting Floor	
	(1)	(2)
ΔLand revenue	0.098***	0.253***
	(0.009)	(0.038)
Land dependency		0.565
		(0.370)
Housing price		0.000
		(0.000)
City Controls	N	Y
Province FE	N	Y
R^2	0.048	0.532
Observations	84	84
Oster's δ		-2.648

The dependent variable in Columns (1) and (2) is the change in the logged residential floor waiting to be sold between year 2013 and 2019. The independent variable is the cumulative change in land sales revenue during the export slowdown period (between the year 2013 and 2016). The city controls include the baseline population structural (male-to-female ratio, share of hukou population, share of college students, average age, the share of population aged between 15 and 39), land sales revenue, government dependency on land sales, housing prices, GDP, GDP growth rate, and the tier of the city. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level. The bottom row reports the δ statistic developed by Oster (2019), the value of which indicates how much more the selection on unobservables than on observables should be to explain away the effect of land sales during the export slowdown period on the amount of residential floor waiting to be sold ($\beta = 0$).
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A6. Longer-term Effect of Land Sales on Homeowners' Protests

	Homeowners' Protests	
	(1)	(2)
Land revenue	0.347***	0.272***
	(0.043)	(0.092)
Events (GDELT)		0.024
		(0.021)
City Controls	N	Y
Province FE	N	Y
R^2	0.012	0.530
Observations	269	269
Oster's δ		6.407

The dependent variable is the binary variable of city's occurrence of homeowners' protests over unfinished buildings with data retrieved in 2022. The key independent variable is the average of land sales revenue during the export slowdown period (between the year 2013 and 2016). The key independent variable is the average land sales revenue and export value from year 2013 to 2016. $Event(GDELT)$ is the logged value of reported events from GDELT. The city controls include the baseline population structural (male-to-female ratio, share of hukou population, share of college students, average age, the share of population aged between 15 and 39), land sales revenue, government dependency on land sales, housing prices, GDP, GDP growth rate, tier of the city, and the shares of the population using Internet and mobile phone. All regressions are weighted by the city's working-age population in 2010. The standard errors are clustered at the province level. The bottom row reports the δ statistic developed by Oster (2019), the value of which indicates how much more the selection on unobservables than on observables should be to explain away the effect of land sales during the export slowdown period on the occurrence of homeowners' protests ($\beta = 0$).
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

C Auxiliary Data

City-level Controls. The data on city-level characteristics are obtained from China's City Statistical Yearbooks. In this paper, I use information on city-level GDP, GDP growth rate, the share of college students, urban population, and the share of households using the Internet and mobile phones.

Construction Projects. Data on construction projects are obtained from China's City Statistical Yearbooks. I focus on two types of construction projects: real estate projects and infrastructure projects. I use information on the city's investment in real estate projects to proxy for real estate projects. Infrastructure projects are measured using the area of constructed roads in the subsequent period.

Housing Oversupply. I use the city-level data of residential floor space waiting to be sold obtained from Rogoff and Yang (2024) to measure the oversupply of housing.

Real Estate Risk. To measure real estate risk, I use the incidence of homeowners' collective protests against paying mortgages on unfinished apartments, leveraging data from a crowdsourced list titled "WeNeedHome" on GitHub.[1] This repository collects information on properties where collectives of homeowners have initiated or threatened to request a loan suspension for their mortgages on the unfinished apartments. As of the data retrieved in 2023, the list includes 348 properties across 94 cities in China where homeowners have taken collective loan suspension for unfinished housing protests.

[1]The GitHub page can be found in https://github.com/WeNeedHome/SummaryOfLoanSuspension.. The data used is retrieved in September, 2023.

D Validity of the Bartik Instrument

The validity of the IV relies on the identification assumptions that conditional on the control of time-varying city characteristics, city fixed effect, and province-year fixed effect, other time-varying city characteristics absorbed in the error term are not correlated with the shift-share IV. According to Borusyak et al. (2022), this assumption holds when the shifts at the product level are as good as randomly assigned.

In particular, the identification assumption can be written as

$$\sum_k s_k g_{kt} \phi_k \xrightarrow{p} 0 \tag{A1}$$

where $g_{kt} = \frac{\Delta X_{kt}^{ROW}}{\sum_c X_{ck,2010}}$ is the shift of product k from the rest of the world divided by the total exporting value of product k in China in 2010. $s_k = \sum_c e_c s_{ck}$ is the weighted average of export exposure to product k across city, where $s_{ck} = \frac{X_{ck,2010}}{L_{c,2000}}$ is city c's initial exposure of product k and e_c is the regression weights in the city-level regression models. $\phi_k = \frac{\sum_c (e_c s_{ck} \epsilon_c)}{\sum_c (e_c s_{ck})}$ is an exposure-weighted expectation of city c's initial characteristics. Equation A1 states the condition of as good as randomly assigned shocks that when weighted by s_k, the correlation of g_{kt} and ϕ_k goes to zero when the sample is large. This can be tested by regressing g_{kt} on ϕ_k weighted by s_k and checking whether the coefficient of ϕ_k is zero.

I consider two sets of city's initial characteristics that may enter ϵ_c hence ϕ_k: (i) city's initial characteristics in 2010, including the share of college graduates, the share of construction employment, the share of manufacturing employment, export to GDP ratio, the share of the non-hukou population, log GDP per capita, and log fiscal revenue per capita; and (ii) pretrends in the outcomes of interest including the change in construction employment share, the change in manufacturing employment share, the change in real estate investment (logged), the change in constructed roads (logged), the change in land sales revenue (logged), the change in land sales area (logged), and the change in land price (logged). Table A7 reports the coefficients and the standard errors for these two sets of city characteristics. All coefficients are not statistically significant, which assures the exogeneity of shocks.

Borusyak et al. (2022) also establish that the effect of the export slowdown can also be estimated using product-level regression, and the magnitude should be identical to the city-level regression. To check this, I run a regression of $\Delta Construction\ employment_{kt}^{\perp}$ on

Table A7. Balance Tests of Product Shocks

	(1) Coef	(2) SE
Predetermined City Characteristics:		
Share of college graduates (%)	0.0059	0.0044
Share of construction employment (%)	0.2194	0.1693
Share of manufacturing employment (%)	0.9650	0.7263
Export to GDP ratio (%)	0.1231	0.0942
Share of non-Hukou population (%)	0.0827	0.0611
Log GDP per capita	0.0010	0.0008
Log fiscal revenue per capita	0.0016	0.0012
Pretrend in Outcomes:		
ΔShare of construction employment (%)	0.0696	0.0521
ΔShare of manufacturing employment (%)	0.0081	0.0323
ΔLog Real estate investment	-0.0192	0.0136
ΔLog Constructed road	-0.0064	0.0050
ΔLog Land revenue	0.0491	0.0426
ΔLog Land area	-0.0537	0.0447
ΔLog Land price	0.0010	0.0008

This table reports coefficients and standard errors (multiplied by 10,000 for readability) from regressing product-specific weighted averages of pre-export-slowdown period's city characteristics and outcome variables on HS6 product-level export shocks, which is recommended by Borusyak et al., 2022. Standard errors are clustered by HS 4-digit codes. All regressions are weighted by the average HS6 product-level export exposure across cities. The predetermined city characteristics are in the year 2010 and the pretrend outcomes are chosen in the year 2011-2012. The shock is constructed starting in the year 2013.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

$\Delta Export_{kt}^{\perp}$ and use $\frac{\Delta X_k^{ROW}}{\sum_c X_{ck,2010}}$ as IV, where superscript $\perp$ refers to the product-level analog of the city-level variables.[2] Table A8 presents the product-level regression result. The coefficient of $\Delta Export_{kt}^{\perp}$ is equal to the coefficient of $\Delta Export$ in the city-level regression.

Another concern on the shift-share IV is related to the "incomplete share" problem brought up in Borusyak et al. (2022) that the initial export exposure could be correlated with the time trends in construction employment share.[3] The city fixed effects remove any time-invariant effects of city's initial exposure share. To address the potential time-varying effect of initial exposure share, I further control the initial exposure share-year fixed effects. I separately control for the deciles, quintiles, quartiles, and terciles of the initial export exposure by year fixed effect. Table A9 shows that the effect of export slowdown on construction employment share remains robust when taking the "incomplete share" problem into account.

Table A8. Product-level Regression

	(1)
	ΔConstruction Employment$_{k,t+1}^{\perp}$
ΔExport$_{kt}^{\perp}$	-0.069***
	(0.022)
First-stage F stat	11.974
Observations	17596

This table reports the result of the product-level IV regression. The dependent variable is product-level analogous to change in construction employment share. $ExpShock_{kt}^{\perp}$ is product-level analogous of export change in city's export change. Standard errors are clustered at HS 2-digit codes.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

[2]Specifically, $\Delta Construction\ employment_{kt}^{\perp} = \sum_c e_c s_{ck} \Delta Construction\ employment_c^{\perp}$ and $\Delta Export_{kt}^{\perp} = \sum_c e_c s_{ck} \Delta Export_c^{\perp}$, where $\Delta Construction\ employment_c^{\perp}$ and $\Delta Export_c^{\perp}$ are the residualized land sales revenue and export shock after controlling the city time-varying characteristics, city fixed effects and province-year fixed effects.

[3]The equivalence of exogenous shocks and condition of IV validity builds on the assumption of constant share among observations

Table A9. Controlling for Incomplete Share

	ΔConstruction Employment$_{t+1}$			
	(1)	(2)	(3)	(4)
ΔExport	-0.150**	-0.060**	-0.069***	-0.068***
	(0.054)	(0.024)	(0.024)	(0.017)
City Controls	Y	Y	Y	Y
Exposure-year FE	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
First-stage F stat	60.669	92.562	93.244	102.982
Mean	1123	1123	1123	1123

The dependent variable in this table is the change in log land sales revenue. Column (1) controls the deciles of initial exposure share by year fixed effect. Column (2) controls the quintiles of initial exposure share by year fixed effect. Column (3) controls the quartiles of initial exposure share by year fixed effect. Column (4) controls the terciles of initial exposure share by year fixed effect. Standard errors are clustered by HS 2-digit codes.

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

E Robustness Checks

E.1 Robustness checks for construction employment

Table A10. Robustness: Specification Checks

	Δ Construction employmemy$_{t+1}$		
	(1)	(2)	(3)
ΔExport	-0.098***	-0.074***	-0.092*
	(0.024)	(0.025)	(0.046)
City Controls	Y	Y	Y
Province-year FE	Y	Y	Y
City FE	Y	Y	Y
First-stage F stat	50.927	89.009	88.940
Mean	2.65	2.65	2.65
Observations	1123	1047	1046

The dependent variable is the change in the construction employment share from year t to year $t+1$. All regressions report IV estimates. Column (1) is the unweighted regression. Column (2) adds the city leader characteristics as controls. Column (3) uses the time-varying city population as the base to construct the construction employment share. Regressions in Columns (2) and (3) are weighted by the city's working-age population in 2010. The mean is the mean value of the urban construction employment share in the city working-age population (with % as the unit). The city controls include the change in log college graduates and the change in log urban population. The standard errors are clustered at the province level.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

E.2 Additional Robustness checks

In this section, I conduct robustness checks for results in real estate investment, constructed road, and land sales revenue.

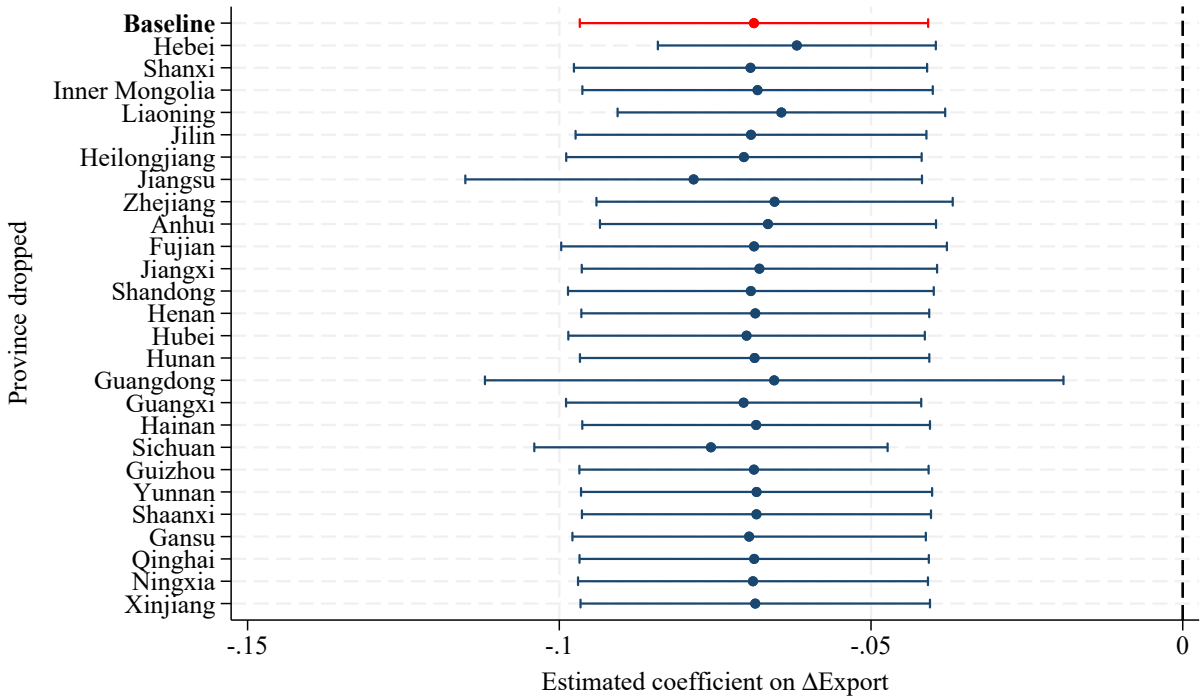


Figure A2. Robustness: Dropping One Province Each Time

This figure reports the estimated coefficient on ΔExport from Equation 4, using the entire sample less one province. For comparison, the baseline estimated coefficient using the entire sample is also presented (in red). The solid points are point estimates, and the caps are 95 percent confidence intervals. Standard errors are clustered at the province level.

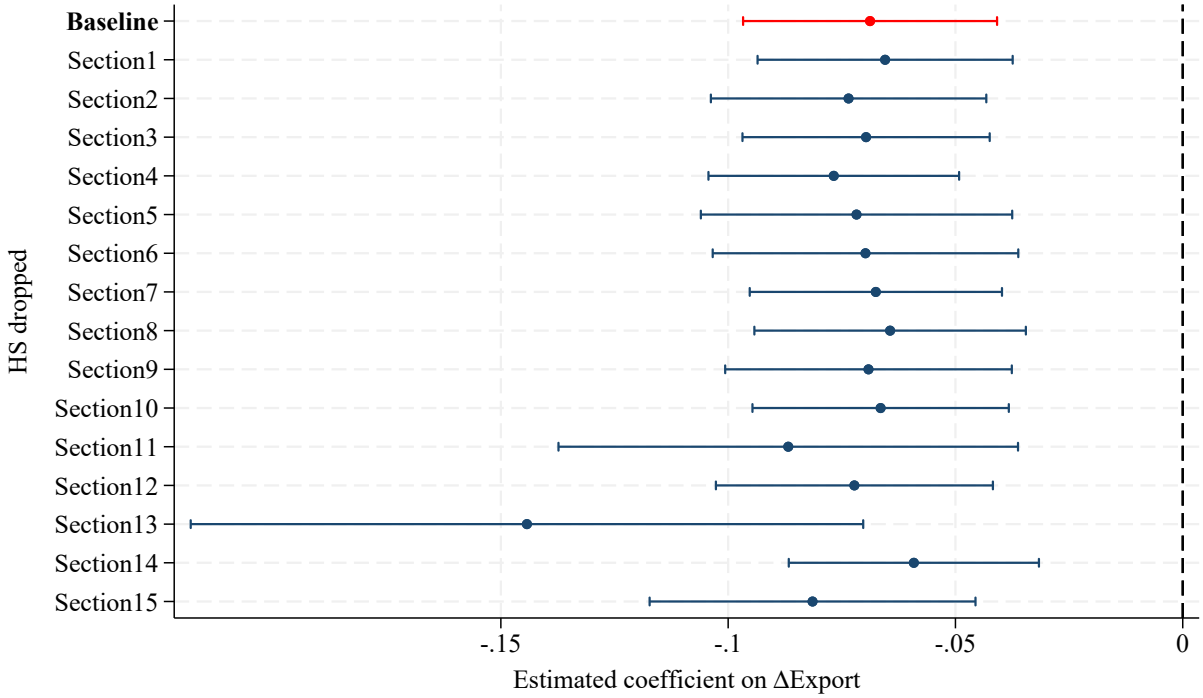


Figure A3. Robustness: Dropping One HS Section Each Time

This figure reports the estimated coefficient on ΔExport from Equation 4, the independent variable ΔExport and its IV are constructed using the entire exporting sample less products from one HS Section. For comparison, the baseline estimated coefficient is also presented (in red). The solid points are point estimates, and the caps are 95 percent confidence intervals. Standard errors are clustered at the province level.

Table A11. Robustness: Alternative Inferences

	Δ Construction Employment$_{t+1}$			
	(1)	(2)	(3)	(4)
	Prov. level	City level	Export similarity	Export similarity: outside prov.
ΔExport	-0.069***	-0.069**	-0.069**	-0.069***
	(0.014)	(0.033)	(0.027)	(0.022)
City Controls	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
Wild cluster bootstrap-t 95% CI	[−0.137, −0.037]			
tF 95% CI	[-0.103, -0.035]			
Observations	1123	1123	1123	1123

The dependent variable is the change in urban employment share. All regressions report IV estimates and are weighted by the city's working-age population in 2010. Column (1) reports the regression clustered at the province level used in the baseline regression. 95% confidence interval is reported through a wild bootstrap-t procedure following Cameron et al. (2008), due to the small number of clusters (28). The tF test for IV proposed by Lee et al. (2022) is also implemented in Column (1)'s baseline regression. Standard errors in Column (2) are clustered at the city level. For Columns (3) and (4), the standard errors are clustered at the export similarity level and the level of the export similarity with cities outside the province.
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table A12. Robustness: Alternative Inferences

	Prov. level	City level	Export similarity	Export similarity: outside prov.
A: ΔReal Estate Investment$_t$				
ΔExport	-0.025***	-0.025**	-0.025***	-0.025**
	(0.009)	(0.010)	(0.008)	(0.009)
City Controls	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
Wild cluster bootstrap-t 95% CI	[−0.064, −0.003]			
tF 95% CI	[-0.047, -0.003]			
Observations	1118	1118	1118	1118
B: Δconstructed Road$_{t+1}$				
ΔExport	-0.036***	-0.036***	-0.036***	-0.036***
	(0.006)	(0.012)	(0.013)	(0.011)
City Controls	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
Wild cluster bootstrap-t 95% CI	[−0.076, −0.011]			
tF 95% CI	[-0.052, -0.020]			
Observations	1069	1069	1069	1069
C: ΔLand Revenue$_t$				
ΔExport	-0.080***	-0.080***	-0.080***	-0.080***
	(0.015)	(0.028)	(0.022)	(0.023)
City Controls	Y	Y	Y	Y
Province-year FE	Y	Y	Y	Y
City FE	Y	Y	Y	Y
Wild cluster bootstrap-t 95% CI	[−0.172, −0.005]			
tF 95% CI	[-0.118, -0.042]			
Observations	1308	1308	1308	1308

The dependent variables in Panel A, B, and C are the change in real estate investment (logged) from $t-1$ to t, the change in constructed road (logged) from t to $t+1$, and the change in land sales revenue (logged) from $t-1$ to t. All regressions report IV estimates and are weighted by the city's working-age population in 2010. Column (1) reports the regression clustered at the province level used in the baseline regression. 95% confidence interval is reported through a wild bootstrap-t procedure following Cameron et al. (2008), due to the small number of clusters (28). The tF test for IV proposed by Lee et al. (2022) is also implemented in Column (1)'s baseline regression. Standard errors in Column (2) are clustered at the city level. For Columns (3) and (4), the standard errors are clustered at the export similarity level and the level of the export similarity with cities outside the province.

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

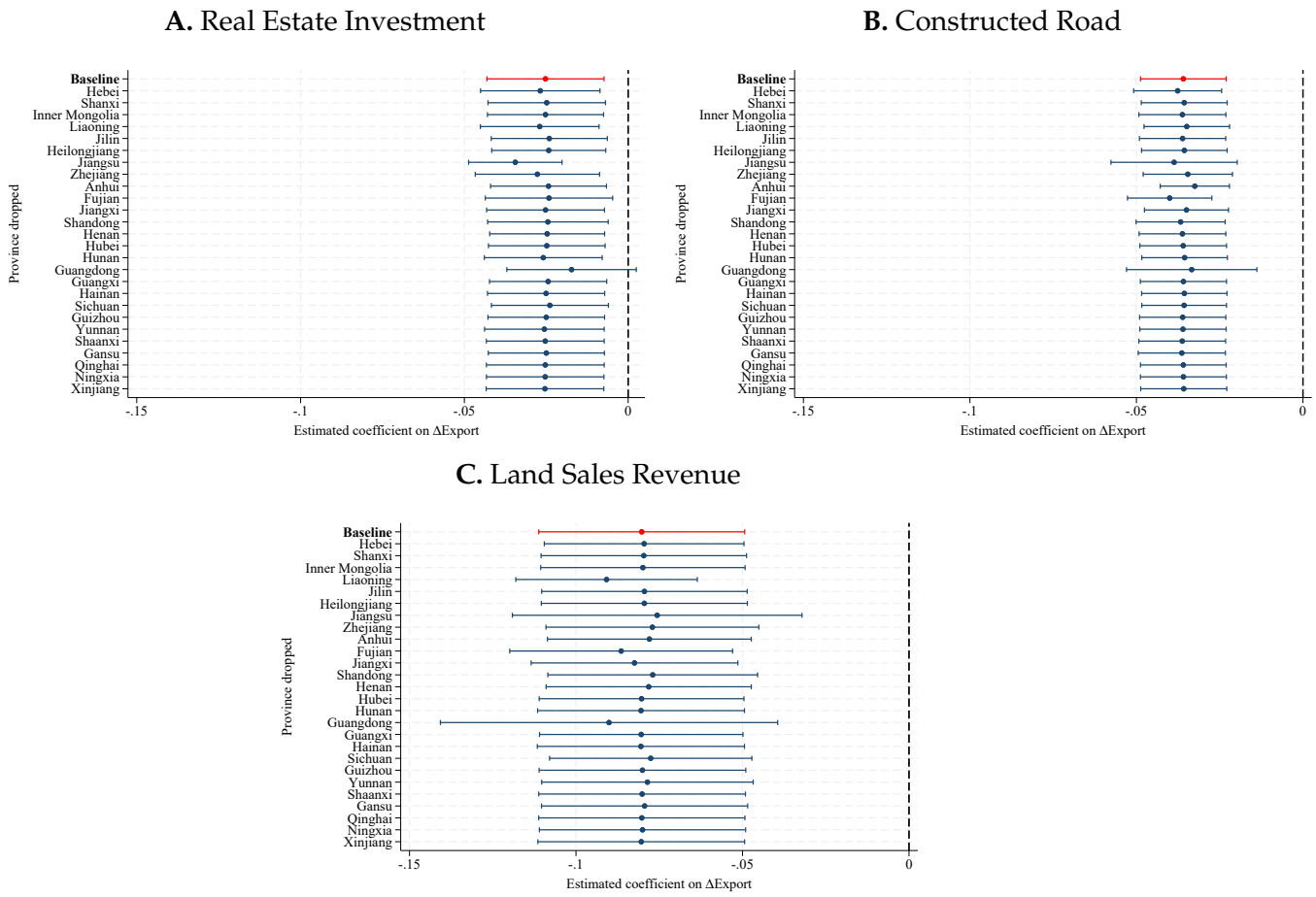


Figure A4. Robustness: Dropping One Province Each Time

This figure reports the estimated coefficient on ΔExport from Equation 4, using the entire sample less one province. For comparison, the baseline estimated coefficient using the entire sample is also presented (in red). The solid points are point estimates, and the caps are 95 percent confidence intervals. Standard errors are clustered at the province level.

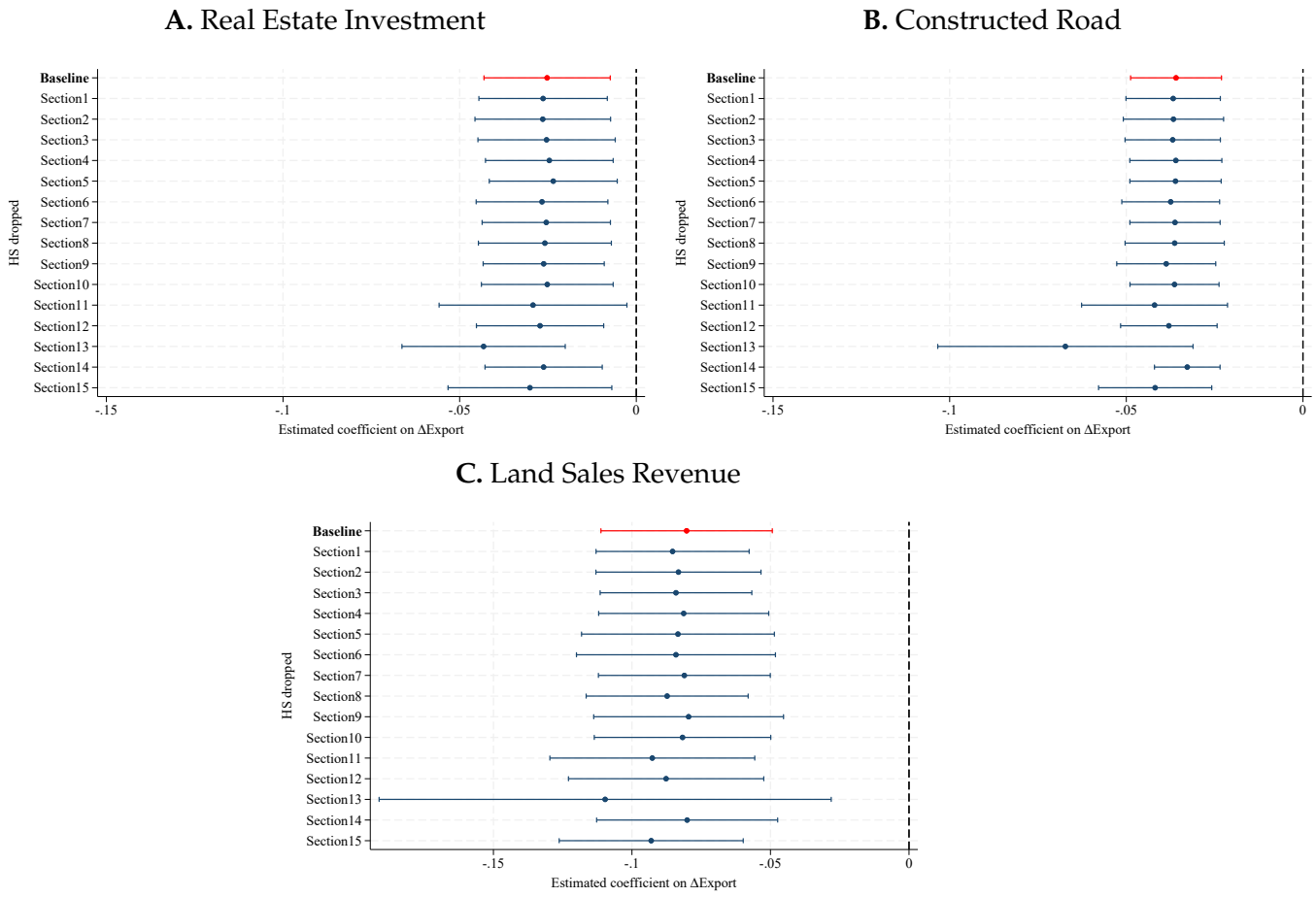


Figure A5. Robustness: Dropping One HS Section Each Time

This figure reports the estimated coefficient on ΔExport from Equation 4, the independent variable ΔExport and its IV are constructed using the entire exporting sample less products from one HS Section. For comparison, the baseline estimated coefficient is also presented (in red). The solid points are point estimates, and the caps are 95 percent confidence intervals. Standard errors are clustered at the province level.