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Competing for Foreign Direct Investment: The Case of Local Governments in China

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Abstract

This article explores the effects of locally adopted economic development zones and government spending promoting foreign affairs on foreign direct investment (FDI)–related employment in Chinese provinces. While these policies are motivated by a desire for employment growth, empirical evidence supporting their effectiveness has proven elusive. Using data from Chinese provinces covering 1999 to 2012, we explore this relationship using a dynamic system generalized method of moments approach. We find some evidence that trade zones enhance FDI-related employment but find none to support the idea that industrial development zones and spending to promote foreign affairs increase employment. Conversely, regional spillovers are consistently found to increase FDI-related employment in our main results and all robustness checks. We argue this highlights the importance of crowd-out effects and agglomeration spillovers, and that coordinating FDI promotion policy across regions may compare favorably to the current approach, which mainly encourages local competition over a largely fixed pool of aggregate FDI.

Keywords

FDI in China, crowd out, agglomeration spillovers, economic development zones

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Zone-based corporate tax incentives have long been utilized by subnational governments in the United States and abroad. Their motivation stems from the idea that physical and human capital will be attracted, enhancing the size and resiliency of the local tax base. However, opponents of these highly controversial policies highlight the role of competition effects and argue an underlying prisoner's dilemma dynamic characterizes decisions over local tax incentives (Ellis and Rogers 2000). Most of the current literature examines the effects of zone-based development incentives in the United States and other advanced economies. For example, enterprise zones (Boarnet and Bogart 1996; Neumark and Kolko 2010; Billings 2009), tax increment finance districts (Anderson 1990; Man and Rosentraub 1998; Dye and Merriman 2000), and empowerment zones (Hanson and Rohlin 2011; Ham et al. 2011) have received much attention from researchers. Surprisingly though, few studies have considered the effect of locally enacted zone-based tax incentives in developing economies, where they are also quite common.

Since the 1978 structural reform of the Chinese economy, attracting foreign direct investment (FDI) has been a stated component of China's overall economic strategy (Chen, Chang, and Zhang 1995). Whereas global FDI levels increased by a factor of 6 between 1990 and 2012, growth in China was over thirtyfold (figure 1). China's share of global FDI grew from 2 percent in 1990 to over 17 percent in 2012.[1] FDI contributed heavily to China's overall growth, as about one-third of China's aggregate gross domestic product (GDP) gains over the period can be attributed to increased levels of inward FDI.[2] Predictably, several studies have investigated the determinants of FDI flows in China.

Concurrent to the explosion of FDI has been the contribution of foreign-owned firms to employment growth. The growth rate of FDI-related employment in China has been an astounding 14.6 percent annually since 1990, accounting for nearly 12.5 million workers by 2012 (China Statistical Yearbook 2013). Moreover, these are desirable jobs. Our data show FDI-related employment salaries were ¥30,273 between 2000 and 2012, comparing favorably to state-owned enterprises (¥25,030) and Hong Kong–Macau–Taiwan firms.[3] This inward FDI is heavily skewed toward the southeastern Pacific coast, where many of China's biggest cities are located.

While nearly all Chinese provincial-level governments have implemented some form of zone-based FDI tax incentive programs, they use different programs and different degrees of intensity (Cheng and Kwan 2000; Boermans, Roelfsema, and Zhang 2011). Unsurprisingly, cross-sectional correlation shows that provinces with the highest levels of FDI are also those

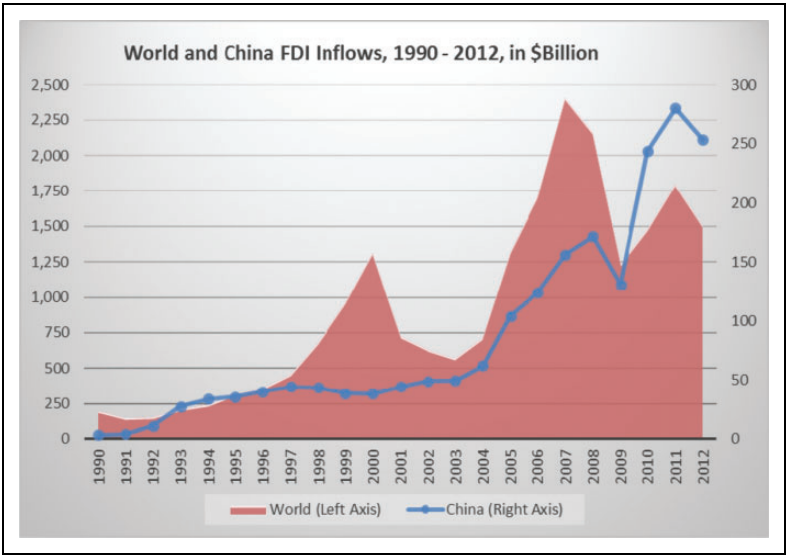

Figure 1. World and China foreign direct investment inflows, 1990–2012 (billions of $). *Data Source:* World Development Indicators, World Bank (2012).

most heavily committed to FDI promotion policies—leading some to claim they "work." However, we find only limited evidence supporting this correlation as a true causal impact.

Importantly, while many papers have investigated the effects of FDI promotion policies on levels of local FDI, studies focusing on their employment creation/retention effects are rare. To address this gap, we explore how provincial-level FDI promotion policies influence FDI-related employment in Chinese provinces (including autonomous regions and direct controlled municipalities). We consider the effect of location-based free trade zones and industrial zones as well as direct government spending on FDI promotion on FDI-related employment. Our models control for effective corporate tax rates, labor market conditions, spillover effects, and other observed and unobserved determinants of FDI. To our knowledge, we are the first to study the use of provincial-level data to consider the employment effects of the four currently used types of locally enacted industrial zones/parks in China.

Due to concerns of nonrandom policy adoption, we use a panel fixed effects dynamic system generalized method of moments (DSGMM) approach developed by Blundell and Bond (1998). The DSGMM approach is designed to mitigate bias in circumstances where the level of the outcome

of interest at any given time is dynamically correlated with its level in previous periods. DSGMM is commonly used when researchers have access to lengthy panel data but are worried about potential endogeneity and/or dynamic persistence in the underlying process generating the main variables of interest (Heid, Langer, and Larch 2012). Furthermore, DSGMM has been used to examine the employment effects of FDI promotion policies in the context of subnational data from the United States (Rogers and Wu 2012).

While the raw correlation between FDI-employment levels and the intensity of local FDI–promotion policies is strong for trade zones and industrial zones, our main results only support the notion that trade zones increase the level of FDI-related employment, with industrial zones having no effect. Moreover, the trade zone result is not robust to simple modifications of the preferred model that use more and less years of lagged instruments in the generalized method of moments (GMM) estimation. Across all estimations, we see no evidence suggesting that higher direct government spending on FDI promotion increases the level of FDI-related employment. Conversely, we find consistent evidence that regional economic agglomeration spillovers play an important role, since higher levels of foreign-owned firms in bordering provinces exert a positive spillover effect on own-province FDI-related employment.

The rest of our article is organized as follows. The second section reviews the literature on FDI promotion policies in China. The third section outlines our empirical methodology. The fourth section discusses our main results. The fifth section presents robustness checks and the sixth section concludes.

Related Literature

FDI Promotion Policies in China

To our knowledge, no previous study has empirically investigated the effects of all the FDI promotion policies we consider on FDI-related employment levels in Chinese provinces. However, other literatures frame our investigation. The broadest of these is the collection of studies that relate zone-based tax incentive programs (of various types) to local economic outcomes, including employment. While several papers in this literature were mentioned earlier, these investigations do not focus on the attraction of FDI. Hence, a detailed review of this literature lies beyond the scope of our article.

Focusing on FDI, an extensive literature looking at the determinants of foreign-owned firms' initial location decisions in China has developed over

recent decades. The factors considered by these studies can be categorized into four main groups: institutional and political features (e.g., locally adopted FDI promotion policies), labor market conditions, the underlying economic potential of the region, and geographic factors. Since the connection between this large literature and our work operates primarily through its identification of the controls we should include in our models, we later discuss these studies as we introduce our data. A summary of this literature is that foreign investors are more likely to choose locations with better political institutions, lower wages for workers, larger populations (i.e., agglomeration effects), higher levels of income and wealth, better access to international transit, and that zone-based FDI promotion tax incentive policies have positive effects on the level of FDI flowing into the specific locations carrying zone designation. Readers interested in comprehensive reviews of this literature should consult Du, Lu, and Tao (2008) or Boermans, Roelfsema, and Zhang (2011). This literature lacks evidence concerning whether FDI is actually gained in the areas geographically designated as incentive zones or if those areas simply draw FDI away from other locations in the region that are outside the incentive zones.

Another related literature considers the effects of various subnationally adopted FDI promotion policies on FDI-related employment. To date, these studies have used data from the United States or other developed countries. Gross and Ryan (2008) examine the effects of local labor protection policies on Japanese FDI flowing into Western Europe. Using panel data spanning the 1980s and 1990s, they find that local employment protection policies had a negative effect on FDI-related full time employment levels, but that it had no significant impact on temporary (part-time) employment. Using panel data from US states, Rogers and Wu (2012) conclude that local FDI-attraction incentives, such as providing more foreign trade zones and establishing overseas offices in trade-partner countries, have positive effects on FDI-related employment at the state level.

Although it does not consider employment outcomes, the study we most directly complement is Wang (2013). Using administrative data from 321 Chinese prefectures and a hand-constructed measure of "'special economic zones" (SEZs) compiled from several distinct sources, Wang shows that SEZs increase the level of FDI flowing into adopting prefectures and that those gains do not crowd out domestic investment within the same prefecture. The study also finds positive effects on wages and total factor productivity. The linkage between our study and Wang's is important, since the SEZ count variable reflects a subset of the local FDI promotion policies we

consider (e.g., high-technology development zones, free trade zones). However, important distinctions are worth noting. First, we consider employment effects, whereas Wang investigated levels of aggregate FDI. Second, Wang did not investigate whether the localized gains experienced by adopting prefectures were offset by, compounded by, or unrelated to FDI-related activity levels in nearby prefectures falling within the same province. Put another way, potential spillover effects were not measured.

We argue this creates a meaningful difference that highlights a needed contribution. If one location's gain is offset by another's loss, then policy adoption could be in the interest of localities, but higher order governments like provinces or nations experience them as a zero-sum game. Finally, Wang also dropped the four largest Chinese municipalities, representing a considerable fraction of China's population and FDI-related activity, due to concerns of noncomparability with other smaller jurisdictions. Since we use data from the provincial level and have access to a long panel, we avoid this issue and retain all areas.

In summary, while the current literature offers some interesting indirect evidence as to how these polices might influence FDI-related employment levels, it does not answer the question we pose. For example, studies of the effects of FDI promotion policies on firm's initial location decisions do not account for potential differences between initial location effects and the influence on the likelihood of future survival and growth. There are also important equity related concerns that differentiate the flow of FDI from FDI-related employment. The former is relevant mainly to the owners of capital (e.g., the wealthy), while the latter is more relevant for working class households.

Finally, we see no reason why studies investigating how FDI promotion policies influence employment levels in high-income countries substitute for an understanding of their effects in developing countries. In fact, intuition suggests they should have different impacts in China due to the fact that FDI is such a dominant component of growth in China. Hence, we fill a gap in the literature by considering the employment effects of local FDI promotion policies within the context of Chinese provinces. This should make our work relevant to economists and government officials both inside and outside of China.

Determinants of FDI

FDI inflows in China have been investigated with relationship to economic outcomes including GDP growth (Zhang and Song 2002; Whalley and Xin

2010), export levels (Sun and Parikh 2001), local tax incentives (Wang 2013), and productivity for domestic firms (Lin, Liu, and Zhang 2009). However, equity-based concerns motivate a view that incorporates other important measures. Specifically, an employment-focused measure has at least three distinct advantages over the commonly used aggregate measures of FDI activity. First, in the context of China and other emerging economies, high levels of aggregate economic development have been accompanied by alarmingly high rates of unemployment and worsening income inequality, making employment an important focal point of China's ongoing economic reform (Liu 2012). Second, foreign-owned firms contribute to local economic development by paying higher wages than domestic firms. Finally, FDI-related employment provides a direct mechanism through which the innovative technologies of developed economies can be transferred into the host country (Ford, Rork, and Elmslie 2008).

Extending previous studies, we argue the determinants of FDI-related employment include our local FDI promotion policy variables of interest, other local tax policies, levels of local infrastructure, characteristics reflecting the size and structure of the local economy, local labor market conditions, and geographic advantages/disadvantages (e.g., proximity to international transport). To begin, we focus on our main policy variables of interest.

Local governments in China currently use four distinct types of tax incentives zones: economic and technological development zones (ETDZs), high-technology industrial development zones (HIDZs), free trade zones (FTZs), and export processing zones (EPZs). Although each aims to stimulate FDI activity in specifically targeted geographic areas, they vary in terms of how they treat foreign-owned firms relative to their domestic counterparts. For example, while a standard corporate income tax (CIT) rate of 25 percent (15 percent for high-tech companies) is charged on foreign-owned firms across all four types of zones, the custom duty and value-added tax (VAT) components are exempted in FTZs and EPZs but charged in ETDZs and HIDZs. Additionally, licenses for new equipment, raw materials, and office appliances are not required for all processing trade enterprises in FTZs and EPZs. Furthermore, in FTZs, a tax is only levied on imported raw materials and preassembled parts, and there is no restriction on the ratio between exports and domestic sales experienced by affected firms. Conversely, in the other three types of zones, taxes are specifically levied on finished products, and there are various limitations on the allowed ratios between exports and domestic sales. To our knowledge, previous

empirical work on FDI attraction has not distinguished between these four distinct types of industrial zones.

While all four policies create specific tax advantages to locating within certain locations, it is not clear whether the higher levels of FDI that previous work has seen flowing into the geographically designated areas represent actual growth in the aggregate regional level of FDI or if it presents the opportunity for foreign investments that would have otherwise occurred in the absence of any tax subsidy to simply select advantaged locations over other competing locations in the same province (i.e., crowd-out effects). For the case of Shanghai, Wei and Leung (2005) show that spatially designated incentive zones led to increased levels of FDI within the city of Shanghai. However, they specifically caution that FDI growth in the urban core may have been partially offset by lower investment in the surrounding areas.

Beyond FDI promotion policies, the level of CIT has been shown to influence FDI in the existing literature (Levinson 1996; List and Co 2000; Woodward 1992). These studies typically indicate that higher CITs have a significant negative effect on levels of FDI.[4] Agglomeration effects have also been shown to impact multinational enterprises' location of entry decision (Kolstad and Villanger 2008; Barrios, Bertinelli, and Stobl 2006; Ge 2009). Additionally, the influence of transportation infrastructure has also been studied in literature (Golub et al. 2003). The results of these studies suggest that better transportation systems lead to more cost-effective operations for industrial production and to lower worker commuting costs (Fredriksson, List, and Millimet 2003).

Broaconier, Norback, and Urban (2005) and List, McHone, and Millimet (2004) investigate the effect of wages on FDI, finding higher average annual compensation per worker significantly lowers FDI flowing into the United States. Moreover, human capital (proxied though educational attainment) is seen as a determinant of FDI locations. Arauzo-Carod, Liviano-Solis, and Manjon-Antolin (2010) show high educational attainment attracts foreign investment. Finally, Gross and Ryan (2008) investigate FDI locations in Western Europe, finding countries with larger populations tend to attract more FDI.

Empirical Specification

Respecting the existing literature in our effort to model FDI-related employment, we follow a panel fixed effects log-linear DSGMM approach. Of the original 434 province/year observations in the panel (fourteen years

over thirty-one provinces), we drop observations from Xizang (Tibet), along with a small number of observations from other provinces, due to missing data. All our estimations incorporate time fixed effects to account for unobservable factors that influence FDI-related employment levels uniformly across provinces over time, province fixed effects to account for unobserved time-invariant province characteristics, as well as six distinct vectors of independent variables. Specifically, we estimate

$$\begin{aligned}\text{logFDIEMP}_{i,t} = {} & \beta_0 + \beta_1 \text{logFDIEMP}_{i,t-1} + \beta_2 \text{POLICY}_{i,t} \\ & + \beta_3 \text{AGGLOM}_{i,t} + \beta_4 \text{INFRASTRUCTURE}_{i,t} \\ & + \beta_5 \text{LABOR}_{i,t} + \beta_6 \text{MARKET}_{i,t} + \beta_7 J_i + \beta_8 T_t + \varepsilon_{i,t}, \quad (1)\end{aligned}$$

where $\text{logFDIEMP}_{i,t}$ represents the natural log of employment in Chinese affiliates of foreign firms in province i in year t and J_i and T_t represent jurisdiction and time fixed effects. Conceptually, this is a panel stock-adjustment model, given inclusion of a lagged dependent variable ($\text{logFDIEMP}_{i,t-1}$). Diagnostics from early specification tests suggest the logged form of most covariates have a better fit with the logged dependent variable. As mentioned previously, the relative importance of FDI-related employment varies greatly across provinces and over time. For example, figure 2 displays the variation in FDI-related employment, both as levels and as shares of total employment, across provinces in 2012.

The $\text{POLICY}_{i,t}$ vector contains our variables of interest. $\text{TAX}_{i,t}$ accounts for the effective CIT burden on foreign firms. While China's decentralization policy mandates the central government levy a unified CIT rate, provinces routinely modify this base by charging top-off CIT rates and by offering tax exemptions and credits. Therefore, since statutory rates change very little over time, we construct a measure of the CIT burden in each province by dividing the total CIT revenue raised from foreign-owned firms by the corporate profits reported by the same companies. Our data suggest effective CIT rates vary considerably, with provinces falling in the lowest CIT quartile collecting an average of 9 percent of foreign firms' profits, whereas provinces in the highest quartile collect nearly 22 percent. Additionally, $\text{GOVSPEND}_{i,t}$ is the overall government spending at the subnational level.

China's distinct types of geographically based industrial zones—$\text{FTZ}_{i,t}$, $\text{EPZ}_{i,t}$, $\text{ETDZ}_{i,t}$, and $\text{HIDZ}_{i,t}$—are the starting points for the policy variables contained in $\text{POLICY}_{i,t}$ (Introduction to China Industrial Parks: Preferential Policies in Industrial Parks, 2014). For a given year, each variable is formed as

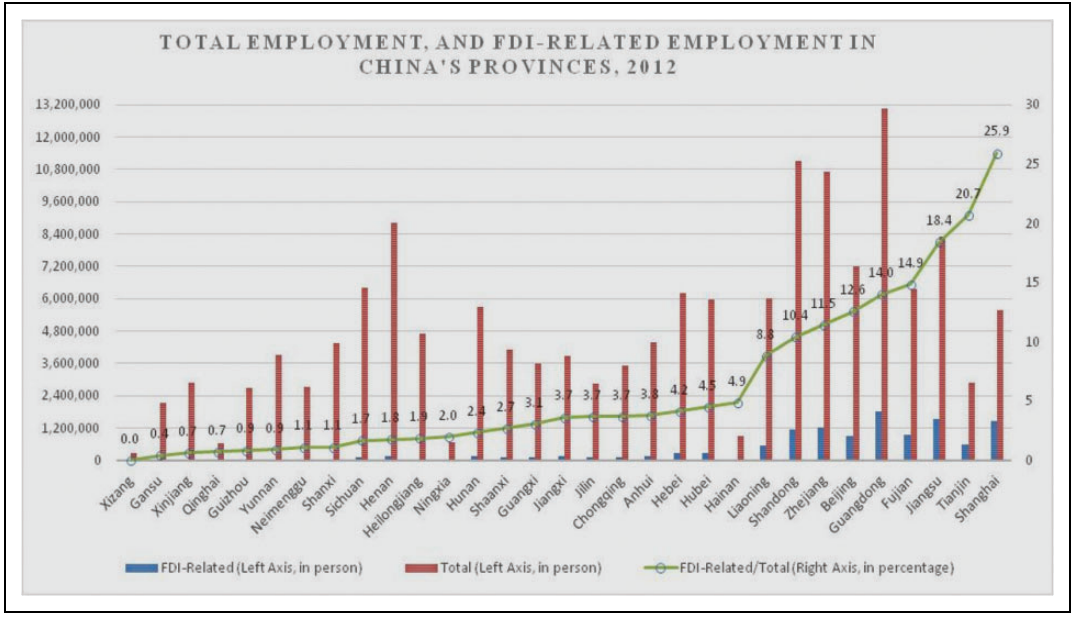

Figure 2. Total employment and foreign direct investment–related employment in China's provinces, 2012. *Data Source:* China Labor Statistical Yearbook, 2013.

the logged number of zones plus one present in the province. This choice seemed appropriate, given the nontrivial number of observations with 0 as the count for the $FTZ_{i,t}$ and $EPZ_{i,t}$ variables. We later discuss the implications of this choice and present a robustness check (with nearly identical findings) that instead uses simple count variables. While all zones offer a discounted CIT rate of 25 percent for foreign-owned enterprises and 15 percent for high-tech foreign companies, they differ when it comes to the collection of VATs for foreign firms. Specifically, FTZs and EPZs exempt foreign firms from license fees as well as VATs on their physical equipment, spare parts, office appliances, and other raw materials/parts. However, firms located in ETDZs and HIDZs do not benefit from the VAT exemption. To account for this, we estimate several specifications of equation (1) with the combined variables $TRADEZONES_{i,t}$ (the sum of $FTZ_{i,t}$ and $EPZ_{i,t}$) and $INDZONES_{i,t}$ (the sum of $ETDZ_{i,t}$ and $HIDZ_{i,t}$). Figure 3 shows the distribution of the combined zone variables for the last year in our panel.

As expected, $TRADEZONES_{i,t}$ is positively correlated with FDI-related employment. Much of this is driven by six provinces along the east coast (Jiangsu, Shanghai, Shandong, Guangdong, Fujian, and Zhejiang) that are FDI-employment rich and lead in terms of trade zones. The provinces with the lowest counts typically have low FDI-related employment. The correlation between FDI-related employment and $INDZONES_{i,t}$ is positive but weaker. For example, Chongqing (ranked 19 in FDI employment) leads with thirty-six industrial zones.

The final policy variable, $FASPEND_{i,t}$, captures annual public spending devoted to fostering foreign affairs. Government officials frequently take business trips to foreign countries and host events that are attended by investors from other countries. It has been argued that these activities facilitate a business-friendly atmosphere, with the purpose of attracting FDI. However, an opportunity cost is associated with these funds. Money spent on entertainment, travel, and events is therefore not available to provide local public goods and services. Hence, the impact of $FASPEND_{i,t}$ on FDI-related employment is theoretically ambiguous. Since these expenditures are often zero, we designate $FASPEND_{i,t}$ as a dummy variable equal to 1 if spending in the category was positive and 0 otherwise.

All firms, but particularly foreign-owned firms, commonly cluster geographically for convenience of resource pooling and to strengthen their bargaining power in relations with domestic firms (Ge 2009). The vector $AGGLOM_{i,t}$ measures agglomeration effects—both in terms of intraprovince (i.e., within province) agglomerations and in terms of interprovince (i.e., cross province) agglomerations. $FORFIRMS/GDP1990_{i,t}$ is the

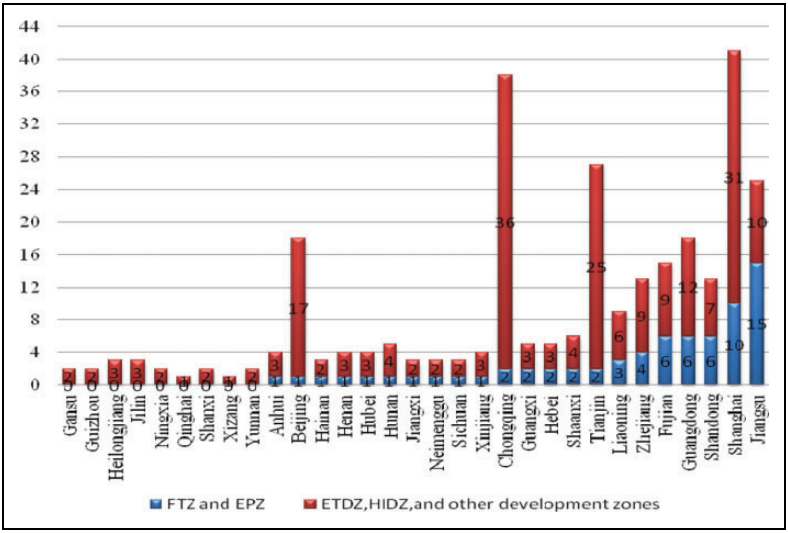

Figure 3. Industrial zones/parks in Chinese provinces in 2012, grouped by type of zones. *Data Source:* China Industrial Parks and Hong Kong Trade Development Council.

number of foreign firms in a province, divided by provincial GDP in 1990 (i.e., an outcome preceding our data). Conversely, cross-provincial agglomerations are captured by $\sum_{j \neq i}$ FORFIRMS/GDP1990$_{i,t}$, which equals the same but now summing over all geographically adjacent provinces.

The INFRASTRUCTURE$_{i,t}$ vector includes both HIGHWAY$_{i,t}$ and RAILWAY$_{i,t}$. Ideally, we would measure the quality of these systems. However, the available data motivate a quantity-driven approach. We measure the length (in units of 10,000 km) of highways and railways in the province each year, respectively. This adds a degree of caution concerning any eventual results associated with these measures, as we understand that average travel times (and their variation) would be more appropriate measures.

Variables in the LABOR$_{i,t}$ vector are characteristics of the provincial-level labor market. COLLEGEGRAD$_{i,t}$ and HSGRAD$_{i,t}$ measure the influences of educational attainment on FDI-related employment. The former is the number of residents (per 10,000 persons) who have successfully graduated from college while the latter reflects the same for high school graduates. Those familiar with the other environments may assume these groups represent nearly exhaustive coverage of the population. However, a significant fraction of workers in China have not completed high school. To

control for labor costs, we use $AVGWAGE_{i,t}$, the average annual wage for workers across all sectors. Finally, overall labor market conditions are captured by local unemployment rates $UNEMPLOY_{i,t}$. Previous research (Fredriksson, List, and Millimet 2003; Rogers and Wu 2012) motivates an ambiguous expectation regarding the effect of unemployment rates. Prevalent joblessness may simultaneously deter FDI (i.e., concerns for weak demand) and encourage FDI (i.e., present a pool of cheap labor) through different channels. $MARKET_{i,t}$ reflects the market size and desirability using the per capita GDP of each province ($PCGDP_{i,t}$). Descriptive statistics for all these measures, as well as a documentation of all their various sources, can be found in table 1.

Several econometric issues plague the estimation of equation (1). First, many of our variables—including FDI promotion policies—are determined simultaneously with employment. While FDI policies may causally influence employment, FDI-related employment may influence political decisions. Another challenge is that unobserved factors may be correlated to both FDIEMP and the POLICY vector. Finally, the inclusion of a lagged dependent variable introduces serial autocorrelation. We use fixed effects to alleviate the second concern and follow an empirical approach—dynamic system GMM—that helps mitigate the problems associated with the first and the third.[5] While the use of fixed effect system GMM helps us address these key issues, it is not without drawbacks. Models of this nature make it difficult to estimate the impact of variables that changes slowly/smoothly over time. While our policy variables of interest do not fall prey to this concern, many of our control variables do (e.g., education and transportation infrastructure quality).

Estimation Results

Our primary results are shown in table 2. We present two versions of equation (1), also discussing several robustness checks in the fifth section. Both estimations include province and year fixed effects and use four years lagged values of independent variables to serve as instruments in each paired set of the system GMM first-differenced and level equations. The autocorrelation tests are all easily passed as are all the Hanson's overidentification tests. Since the decision to use four years of lags could be viewed skeptically as being somewhat arbitrary, we later show how our findings are influenced by using shorter lag lengths (three years) and longer lag lengths (five years).

Beginning with our policy variables of interest, we find the effective local corporate tax does not significantly influence FDI-related employment. As

Table 1. Descriptive Statistics.

Variables	Observations	Mean	Standard deviation	1999 Mean	2012 Mean	Minimum	Maximum	Source
$FDIEMP_{i,t}$	434	885,288	2,235,405	101,172	392,709	116	20,960,775	China Labor Statistical Yearbook
$TAX_{i,t}$ (percentage)	434	13.8	20.19	0.31	0.20	0	198.4	China Public Finance Statistical Yearbook
$TRADEZONES_{i,t}$	434	1.80	2.74	0.64	2.26	0	15	Hong Kong Trade Development Council
$FTZ_{i,t}$	434	0.44	0.86	0.38	0.52	0	4	Hong Kong Trade Development Council
$EPZ_{i,t}$	434	1.33	2.26	0.25	1.74	0	13	Hong Kong Trade Development Council
$INDZONES_{i,t}$	434	6.14	7.52	4.43	6.91	0	36	Hong Kong Trade Development Council
$ETDZ_{i,t}$	434	4.25	7.08	2.70	5.00	0	34	Hong Kong Trade Development Council
$HIDZ_{i,t}$	434	1.88	1.40	1.77	1.91	0	6	Hong Kong Trade Development Council
$FASPEND_{i,t}$ (dummy)	434	0.06	0.23	0	0.13	0	1	China Public Finance Statistical Yearbook
$FORFIRMS_{i,t}$	434	9,936	15,440	6.916	14,206	70	98,564	China Statistical Yearbook
$\sum_j FORFIRMS_{j \neq i}$	434	36,686	1,402	28,234	59,894	0	168,911	China Statistical Yearbook
$HIGHWAY_{i,t}$	434	0.16	0.12	0.04	0.32	0	0.58	China Statistical Yearbook
$RAILWAY_{i,t}$	434	0.26	0.16	0.21	0.32	0	0.95	China Statistical Yearbook
$COLLEGEGRAD_{i,t}$	434	11.12	10.46	2.73	20.16	0.08	47.9	China Statistical Yearbook
$HSGRAD_{i,t}$	434	19.60	15.68	8.48	25.53	0.24	75.0	China Statistical Yearbook
$AVEWAGE_{i,t}$	434	23,198	14,187	8,424	47,014	6,065	85,306	China Statistical Yearbook
$UNEMPLOY_{i,t}$ (percentage)	434	3.62	0.72	2.99	3.32	0.60	6.5	China Statistical Yearbook
$PCGDP_{i,t}$ (yuan)	434	20,675	16,941	7,733	43,387	2,545	93,173	China Statistical Yearbook
$GOVSPEND_{it}$ (100 million)	434	1,298.9	1,278.5	290.0	3,457.7	49.53	7,387.9	China Statistical Yearbook
$GDP1990_i$ (100 million)	434	598	405	597.96	597.96	27.7	1,559	China Statistical Yearbook

Table 2. Estimation Results—Foreign Direct Investment–related Employment.

Variables	Model 1 Coefficient	Model 1 Standard error	Model 2 Coefficient	Model 2 Standard error
Independent Variables				
$TAX_{i,t}$	−0.132	0.128	−0.106	0.215
Log $GOVSPEND_{i,t}$	0.111*	0.069	0.096	0.111
Log$(TRADEZONES + 1)_{i,t}$	2.022***	0.687		
Log$(FTZ + 1)_{i,t}$			0.468	1.242
Log$(EPZ + 1)_{i,t}$			1.378**	0.660
Log$(INDZONES + 1)_{i,t}$	−0.826	0.685		
Log$(ETDZ + 1)_{i,t}$			0.171	0.734
Log$(HIDZ + 1)_{i,t}$			−29.077	21.491
$FASPEND_{i,t}$	0.052	0.085	0.055	0.128
Log $FDIEMP_{i,t-1}$	0.003	0.089	−0.022	0.156
Log $\sum_{j \neq i} FDIEMP_{i,t}$	0.351***	0.081	0.257**	0.113
Log$(FORFIRMS/GDP1990)_{i,t}$	0.095	0.203	0.003	0.338
Log $\sum_{j \neq i}$ $(FORFIRMS/GDP1990)_{i,t}$	0.820***	0.302	0.784*	0.417
Log $HIGHWAY_{i,t}$	−0.341	0.215	−0.249	0.369
Log $RAILWAY_{i,t}$	0.575	0.406	0.36	0.276
Log $COLLEGEGRAD_{i,t}$	0.978***	0.479	1.022*	0.62
Log $HSGRAD_{i,t}$	−0.621	0.543	−0.363	0.901
Log $AVEWAGE_{i,t}$	−2.306**	0.905	0.543	1.587
$UNEMPLOY_{i,t}$	6.136	6.791	13.78	11.78
Log $PCGDP_{i,t}$	2.205**	0.935	0.623	1.427
Constant	−2.037	2.33	1.438	5.068
Instrumental variables				
First differenced equation	y_{t-4}, Δx_{t-4}		y_{t-4}, Δx_{t-4}	
Level equation	Δy_{t-3}, Δx_{t-4}		Δy_{t-3}, Δx_{t-4}	
Hanson's *J* test	$p = .3486$		$p = 1.000$	
AR test	AR(4): $p = .6529$		AR(4): $p = .6021$	
Province fixed effects	Yes		Yes	
Year fixed effects	Yes		Yes	
Number of observations	409		409	
Number of groups	30		30	

*Significant at .10 level.
**Significant at .05 level.
***Significant at .01 level.

such, we do not contribute to the ongoing debate in the literature concerning the advantages/disadvantages of higher local corporate taxation. One interpretation of the insignificant result is that the mobility of capital and labor

effectively motivates local governments in China to use these tax revenues wisely—and thus produces no net average impact on employment. This idea is supported by the positive effect found in model 1 on GOVSPEND, which is positive and significant. In general, across our main estimation and all later robustness checks, government spending is either significant and positive or simply insignificant, while the TAX variable is either significant and negative or insignificant. We find this aspect of the results reassuring.

The results from model 1 indicate trade zones significantly increase local FDI-related employment, with an elasticity of about 2.0, but that industrial zones do not. Collectively, this suggests the additional tax incentives attached to trade zones are impactful. The insignificant result on the industrial zone variables—entering separately in model 2 or jointly in model 1—is also consistently supported in each robustness check later presented. Hence, there is reason to be confident they do not raise employment levels at least at the provincial level. Taken alongside evidence that FDI levels *within industrial zones* increases (Wang 2013) due to these policies, this highlights the importance of crowd-out effects. On the other hand, the positive effect of trade zones on FDI-related employment, while promising, is less robustly supported by the alternative specifications we later present. We leave a deeper discussion of this issue to that portion of this article. The final policy variable, FASPEND, indicates whether the province directly spent money on business trips/events to promote FDI. It registers insignificant effects across both estimations.

While the effects of the other covariates are not the focus of this article, we here discuss their performance in our models. It is worth stressing that fixed effect system GMM models are not well equipped to estimate the effects of variables that change smoothly over time. Hence, it is not surprising that many of our control variables do not achieve significance. For example, both variables measuring transportation infrastructure (highways and railways) are insignificant in both models 1 and 2. On the other hand, a strong linkage between human capital—as captured by our college graduation rate variable—and higher levels of FDI-related employment, surfaces. The estimated elasticity from both models suggests an increase in the percentage of college graduates present in the local labor market raises the number of FDI-related jobs by roughly the same percentage. One implication of this result is that efforts to attract FDI through tax incentives should, at the very least, be complemented with efforts to expand the provision of higher education. The results indicate that FDI-related employment is higher when per capita GDP is greater but also intuitively suggest that conditions for employment are best when wages are low—an ideal

combination for firms in general. The opposing effects of wages and per capita GDP should be viewed collectively, as the two variables have a high degree of comovement.

Turning to our agglomeration variables, we see results that are consistent with our expectations regarding positive regional spillovers. Variables capturing the level of FDI-related employment and the concentration of foreign-owned firms in bordering provinces are positive and significant in both models. This pattern also holds in the robustness checks presented below. For the within-province variables, agglomeration effects are still expected to lower costs and foster positive technology spillovers, but now direct competition may bid up input prices and compromise demand for the firm's output. Both table 2 models find the effects of the within-province agglomeration variables to be insignificant, with the same coefficients in the robustness checks generally insignificant or negative and reaching significance in some cases. On net, our results suggest the best setting to support FDI-related employment growth would be to have little competition within the province, but to still be able to benefit from positive agglomeration spillovers (i.e., access to common suppliers, distribution opportunities, labor pools and so on) from bordering provinces.

Robustness Checks

Since our models were subject to several important choices we made along the way, we include several robustness checks. These results are presented in tables 3 and 4. Table 3 contains two estimations—each mimicking model 1 from table 2—save their use of less (three years) and more (five years) of lagged instruments. Model 1(a) passes the diagnostic tests for autocorrelation and overidentification, but just barely. Using fewer than three years leads to failing both tests badly. Model 1(b), which uses five years of lags, passes both tests, though not quite as cleanly as our preferred results from table 2. Several points are worth noting. Several key findings are supported. Our regional agglomeration spillovers are still strong and positive, the tax and spending variables for local government policy still perform similarly, many control variables reach the same results, and the industrial zone incentives are still uniformly insignificant. The one important difference in results comes on the key trade zones variable, as it is somewhat compromised by the move in either direction. Using fewer lags cuts the magnitude of the effect by over half, but statistical significance is still retained. Using more moves the point estimate even lower and significance is lost. As such, an appropriate interpretation of the trade zones effect would be one

Table 3. Robustness Check—Fewer and Additional Lagged Instruments (Three and Five Years).

Variables	Model 1(a) Coefficient	Model 1(a) Standard error	Model 1(b) Coefficient	Model 1(b) Standard error
Independent variables				
$TAX_{i,t}$	−0.255**	0.104	0.001	0.093
Log $GOVSPEND_{i,t}$	0.066	0.059	0.165**	0.076
Log$(TRADEZONES + 1)_{i,t}$	0.836*	0.493	0.552	1.130
Log$(INDZONES + 1)_{i,t}$	0.374	0.505	0.011	0.831
$FASPEND_{i,t}$	0.059	0.064	0.117	0.088
Log $FDIEMP_{i,t-1}$	−0.025	0.062	−0.072	0.093
Log $\sum_{j \neq i} FDIEMP_{i,t}$	0.288***	0.060	0.172*	0.089
Log$(FORFIRMS/GDP1990)_{i,t}$	−0.377**	0.164	−0.038	0.234
Log $\sum_{j \neq i}$ $(FORFIRMS/GDP1990)_{i,t}$	1.239***	0.269	1.215***	0.313
Log $HIGHWAY_{i,t}$	−0.610***	0.219	−0.116	0.222
Log $RAILWAY_{i,t}$	0.199	0.317	0.635	0.470
Log $COLLEGEGRAD_{i,t}$	1.265***	0.378	1.564***	0.527
Log $HSGRAD_{i,t}$	−0.187	0.392	−0.898	0.584
Log $AVEWAGE_{i,t}$	−0.711	0.729	−1.525	1.072
$UNEMPLOY_{i,t}$	4.892	5.553	24.339**	10.77
Log $PCGDP_{i,t}$	1.457**	0.658	1.863*	0.978
Constant	−4.998**	2.036	−5.187*	2.894
Instrumental variables				
First differenced equation	y_{t-3}, Δx_{t-3}		y_{t-5}, Δx_{t-3}	
Level equation	Δy_{t-2}, Δx_{t-3}		Δy_{t-4}, Δx_{t-5}	
Hanson's *J* test	$p = .0631$		$p = .6518$	
AR test	AR(3): $p = .0551$		AR(5): $p = .1320$	
Province fixed effects	Yes		Yes	
Year fixed effects	Yes		Yes	
Number of observations	409		409	
Number of groups	30		30	

*Significant at .10 level.
**Significant at .05 level.
***Significant at .01 level.

with a degree of caution, while the other key findings invoke greater confidence.

Moreover, a helpful comment obtained during the review process led us to consider the possibility that our conclusions may be sensitive to the choice we made to take the natural log of the tax incentive zones variables,

Table 4. Robustness Check—Incentive Zones Measured as Count Data.

Variables	Model 3 Coefficient	Model 3 Standard error	Model 4 Coefficient	Model 4 Standard error
Independent variables				
$TAX_{i,t}$	−0.151	0.118	−0.127	0.132
Log $GOVSPEND_{i,t}$	0.475	0.609	0.714	0.724
$TRADEZONES_{i,t}$	0.158***	0.046		
$FTZ_{i,t}$			0.069	0.129
$EPZ_{i,t}$			0.184***	0.054
$INDZONES_{i,t}$	−0.005	0.014		
$ETDZ_{i,t}$			−0.001	0.013
$HIDZ_{i,t}$			−2.017	1.807
$FASPEND_{i,t}$	−0.031	0.068	−0.023	0.070
Log $FDIEMP_{i,t-1}$	−0.043	0.090	−0.103	0.099
Log $\sum_{j \neq i} FDIEMP_{i,t}$	0.264***	0.081	0.270***	0.092
Log$(FORFIRMS/GDP1990)_{i,t}$	−0.024	0.177	−0.078	0.210
Log $\sum_{j \neq i} (FORFIRMS/GDP1990)_{i,t}$	0.870***	0.282	0.901***	0.327
Log $HIGHWAY_{i,t}$	−0.482**	0.198	−0.442**	0.224
Log $RAILWAY_{i,t}$	0.156	0.368	0.131	0.412
Log $COLLEGEGRAD_{i,t}$	1.087***	0.398	1.227***	0.453
Log $HSGRAD_{i,t}$	−0.273	0.527	−0.324	0.548
Log $AVEWAGE_{i,t}$	−1.089	0.805	−0.417	0.951
$UNEMPLOY_{i,t}$	19.123***	6.899	21.66**	8.228
Log $PCGDP_{i,t}$	1.017	0.841	0.453	0.934
Constant	−5.278	3.639	4.092	8.428
Instrumental variables				
First differenced equation	y_{t-4}, Δx_{t-4}		y_{t-4}, Δx_{t-4}	
Level equation	Δy_{t-3}, Δx_{t-4}		Δy_{t-3}, Δx_{t-4}	
Hanson's *J* test	$p = .4631$		$p = .9958$	
AR test	AR(4): $p = .0204$		AR(4): $p = .4753$	
Province fixed effects	Yes		Yes	
Year fixed effects	Yes		Yes	
Number of observations	409		409	
Number of groups	30		30	

*Significant at .10 level.
**Significant at .05 level.
***Significant at .01 level.

rather than directly entering their raw counts. Table 4 replicates table 2 in every way, save the replacement of the logged policy variables with count variables. A frustration is that model 3 now fails the autocorrelation test. In

general though, all of our main findings are retained. Evidence for the effectiveness of trade zones is still seen, the insignificance of the industrial zones carries over, and the coefficients and standard errors for the regional agglomeration measures demonstrate stability.

Finally, we estimated a final check representing the combination of our robustness (i.e., using the raw count variables and varying the number of lags). These results, which are not included, show a similar progression as the one seen by moving from tables 2 to 3.

Regarding our originally defined question of interest—whether or not locally adopted FDI promotion policies in China lead to more FDI-related jobs at the provincial level—we argue the most reasonable interpretation of our collective results across the primary models, the robustness checks, and the many closely related estimations that were not presented, is that no consistent evidence is found to support the idea that industrial zones or direct local government spending on foreign affairs enhance the level of FDI-related employment in Chinese provinces but that trade zones may well have a positive impact. The degree of certainty over the latter result is not high. Of course, our study does not rule out the possibility that these policies, including those found to have no impacts, generate positive effects on outcomes other than employment. Similarly, we have no reason to challenge the conclusion from previous studies establishing the effectiveness of these same policies in attracting FDI to the smaller geographic zones over which they target.

Conclusion

Subnational governments, particularly those in rapidly emerging economies like China, face two important questions when it comes to crafting public policies meant to attract FDI and FDI-related employment. First, do incentive programs attract higher levels of FDI-related activities to the region than what would have been experienced in the absence of the incentive? If so, is the size of the increase enough to justify the tax expenditure associated with the program? The second question becomes irrelevant if the answer to the first is no. We also note that the answers to these questions are of interest to national governments, if there is good reason to suspect that subnational governments are competing over economic activity in what is potentially a zero-sum game (Chirinko and Wilson 2008).

This study contributes to the ongoing literature considering FDI promotion policies by investigating the effects of several distinct types of locally adopted incentives on provincial-level FDI-related employment levels in

China. After constructing a novel panel containing several types of local incentives, we model this relationship using the DSGMM approach developed by Blundell and Bond (1998). This mitigates several econometric challenges associated with panel data displaying both intravariation (within province over time) and intervariation (between provinces) for our policy variables of interest. In doing so, we provide a novel exploration of the relationship between FDI-related employment levels and FDI promotion policies at a provincial level in China. Policies of this nature are becoming increasingly popular in China and other rapidly developing economies; suggesting the previous lack of empirical analysis exploring their employment effects is problematic.

Consistent with a crowd-out story that suggests higher levels of FDI-employment flowing into areas given zone-based tax incentives are largely offset by reductions in surrounding areas, we do not find much evidence to support the idea that most FDI promotion policies in China causally raise FDI-related employment at the provincial level. Neither direct spending to promote foreign affairs nor industrial zone incentive designation impacted the level of employment. This finding mirrors that of Neumark and Kolko (2010), who examined the effects of enterprise zones in California, suggesting the type of tax incentive and the economic environment—both of which differ between our study and that investigation—may not override the underlying incentives at stake. At the same time, some limited evidence is found to support the idea that trade zones—which carry additional benefits over industrial zones—do raise FDI-related employment levels. While we do not deem these results to be robust for reasons outlined above, they are at least suggestive.

On net then, we conclude that FDI promotion programs of this nature in China are likely not worth their social costs and that they do not increase FDI-related employment in China in a clear and robust manner—at least in terms of provincial-level outcomes and when focusing on the baseline level of incentives (i.e., industrial zones). However, we do find suggestive evidence that pairing the baseline incentive with a VAT exemption (i.e., trade zones) creates a positive effect on employment. Our work complements Wang (2013), who finds positive effects of these policies in terms of attracting FDI at the municipal level.

The importance of geographic spillovers explains how both sets of results are simultaneously accurate. Specifically, we find consistent evidence that interprovince agglomeration spillovers significantly increase FDI-related employment levels. Hence, improved physical, economic, and social integration across provincial regions within China may be worth

incentivizing. At the same time, zone-based incentives that simply reward investors for selecting one location over another in the same region should be discouraged.

Further extensions could examine who benefits from FDI promotion polices in China. After all, these programs are popular and have survived for several decades. Are the tax incentives windfall gains for the investors who get them? Do local government officials benefit from the policies? Do areas fortunate enough to be inside the zone designation simply "steal" employment from areas on the outside? If so, how far is the geographic reach of these crowd-out effects? We leave these and other questions for future research.

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Notes

1. Calculated by the authors using World Development Indicators data (World Bank).
2. Calculated using data from China Statistical Yearbook, multiple years.
3. Annual data spanning 2000 through 2013, National Bureau of Statistics of China.
4. Studies suggest that, on average, foreign direct investment decreases by 3.7 percent following a 1 percentage point increase in the marginal corporate income tax level (Organization for Economic Co-operation and Development 2008).
5. For a detailed description of the dynamic system generalized method of moments procedure, see Blundell and Bond (1998).

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