

ADB Economics Working Paper Series



Winners and Losers of Multinational Firm Entry into Developing Countries: Evidence from the Special Economic Zones of the People's Republic of China

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No. 276 | October 2011



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Avraham Ebenstein is Professor of Economics in the Hebrew University of Jerusalem. The author acknowledges generous financial support from the Asian Development Bank. Excellent research assistance was provided by Revital Bar, Joan Fang, Eyal Frank, and Michael Freedman. Special thanks for comments and helpful advice are due Yaohouei Zhao and Chuanchuan Zhang. The author accepts responsibility for any errors in the paper.

Asian Development Bank

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics

©2011 by Asian Development Bank
October 2011
ISSN 1655-5252
Publication Stock No. WPS_____

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Abstract

This paper examines the impact of multinational firm entry into local labor markets on employment, productivity, and wages. It exploits a natural experiment associated with the People's Republic of China's rapid economic reforms and assignment of cities to special economic zone status in the 1980s and 1990s. Using data on both firms and workers, it is found that these policies increased foreign direct investment, which raised average labor productivity in these labor markets. However, only modest increases in median wage rates across these cities are observed in the face of large increases in wage inequality and rising local prices, limiting the benefits to most workers in these cities. Evidence is presented that corporate profits captured most of the increase in productivity in these areas.

I. Introduction

In 1978, the People's Republic of China's (PRC) premier Deng Xiao Ping launched the country's efforts to open its doors to the world. Since the changes that he envisioned were drastic, he initiated a policy by which key strategic cities would be chosen as experimental zones with privileged status. The special economic zones (SEZs) and closely related free trade zones (FTZs) were spectacularly successful and attracted foreign direct investment (FDI), as well as agglomeration of domestic firms hoping to do business with multinational corporations. While the strategies used to attract investment were extremely successful, little is known as to the success of the policy's intention of foreign investment inducing productivity improvement in domestic PRC firms. It is even less clear whether the wage increases due to foreign investment has translated into wage increases for Chinese workers, especially those with low skill levels.

Has the PRC's phenomenal growth created a tide that "lifted all ships"? Many fear that corporate profits have captured the bulk of the surplus generated by lower costs of production in the PRC, leaving labor with a smaller share of an albeit larger pie. If wage increases for workers are modest, rising average price levels may leave many workers *worse* off as a result of trade, in terms of purchasing power. Examining the PRC experience in these tax-privileged zones is important for evaluating the potential of globalization to reduce poverty in developing countries, as the PRC experience has been hailed as a model. It has been used to encourage other countries to pursue similar development strategies, although in some countries such as India, local groups have blocked the implementation of SEZs due to concern about their impact on the local economy. Thus, an accurate assessment of the economic impact of these policies on such factors as employment, wages, and income inequality is of significance both in the PRC and in developing countries around the world.

This study exploits the phased rollout of the PRC's SEZs, and closely related FTZs¹, to assess the impact of multinational activity on local labor markets, and the welfare of workers in these cities. A key challenge in the analysis is that these areas were chosen endogenously, as the majority of these areas were in coastal areas that may have benefited from the PRC's growth in the absence of special treatment. The study exploits a quasi-experiment associated with Deng Xiao Ping's famous "southern tour" in 1992. His

¹ As will be discussed, there are several other special zones similar to SEZs and FTZs included in the analysis. Specifically, export processing zones (EPZ) and coastal open cities (COC) are included in the analysis. An area is generally referred to as a "special economic zone" when it has any of these four designations (SEZ, FTZ, EPZ, or COC).

visit and policy statements in favor of economic liberalization provided political impetus for expanding the number of cities with special status, and increasing autonomy within the existing SEZs.

This paper examines a panel of PRC cities—its firms, workers, and whether the cities are tax-privileged each year. The sample period for firms (1950–2002) and for workers (1988–2002) was characterized by large increases in FDI to the PRC, with much of the increase occurring in the SEZs. Since the timing of the establishment of the zones varied across cities, it is possible to estimate models that exploit variation within a city in terms of FDI and other outcomes of interest such as labor productivity (proxied by valued added per worker) and average wage levels.

The paper also examines whether the location of higher productivity firms leads to higher real wages for the average worker, for only the highest earning worker, or if the extra productivity is completely captured by an increasing return to capital. The results indicate large potential benefits and pitfalls to other Asian countries of rolling out similar zones. These zones encourage foreign firm entry, and the agglomeration of domestic firms that appear to benefit from technology spillovers. However, the potential benefit of these policies is tempered by evidence of modest growth in real wages. It can be concluded that the introduction of an SEZ in a context of cheap surplus labor may lead to soaring corporate profits but be of little benefit to the average worker. While these zones may lead to reallocation of labor from the rural to urban labor markets, the welfare improvement for workers already in these cities is modest. Insofar as similar patterns of rising wages and prices would follow from these zones in other Asian countries, social insurance programs should be in place to protect low-skilled workers from experiencing reduced purchasing power following these programs.

The paper is organized as follows. Section II discusses the background of how SEZs and FTZs were established, and the special treatment they provided to multinational firms. Section III presents data on firms, workers, and the rollout of special-status zones in the PRC. Section IV presents the estimation strategy and Section V the empirical results. Section VI concludes with a brief discussion of the policy implications of the findings.

II. Background

A. The PRC's Special Economic Zones

The SEZ experiment began soon after Deng Xiaoping's 1978 policy statement in which he argued for greater economic liberalization, and more interaction with firms from overseas (Yeung et al. 2009). These zones were envisioned as small laboratories to

explore the economic potential of a further opening up of the PRC's economy, and so four cities were chosen for SEZ status, in which they were able to operate with administrative autonomy from the provincial government, and foreign firms were allowed tax exemptions. The SEZs were strategically located in coastal areas close to islands with capitalist economies, including Xiamen (near Taipei, China); Zhuhai (near Macao, China); and the most successful SEZ, Shenzhen, which capitalized on its proximity to Hong Kong, China. While the areas chosen were in locations convenient to foreign firms, they were by no means already developed areas. In fact, the government focused on undeveloped cities to minimize resistance to the new policies, and to limit damage should the experiment fail. For example, prior to obtaining SEZ status in 1980, Shenzhen was a small fishing village without even a single traffic light (CCPR 1987). Twenty years later, its population had exceeded 10 million. The SEZs were successful at attracting foreign investment and cheap migrant labor from nearby provinces almost immediately (Yeung et al. 2009). By 1985, the SEZs accounted for more than 20% of the PRC's FDI. The success of the original SEZ cities spurred the government to open 14 coastal cities to foreign investment in 1984 (Yeung and Hu 1992), which also began to attract additional foreign firms attempting to capitalize on the PRC's cheap labor and goods for lucrative overseas consumer markets.

During the late 1980s, however, many policy makers in the PRC felt that the country's entry into the world economy was proceeding too slowly. Some believed that the PRC's reform efforts were stagnating and meant to develop faster, yet they met resistance from conservative elements of the country who wished to maintain the status quo. Deng Xiao Ping's famous visit to the South in 1992 was intended to promote reform policies, and embolden those who wished to continue the PRC's move to capitalism. In the wake of Deng's visit, FTZs were established in several other coastal cities, including Shanghai's highly successful Putong Economic Zone. Smaller-scale economic and technological development zones were also opened throughout the country, with many zones being created in the country's interior.

These zones have generated some controversy, however. Several scholars have questioned the sustainability of SEZs due to a phenomenon known as "development zone fever": the opening of development zones beyond what is economically efficient or feasible, which results in a waste of resources and arable land (Wong and Tang 2005, Zhang 2011).² Other scholars note that the preferential policy treatment accorded to the SEZs are largely responsible for the sustained rise of regional disparity in the PRC, particularly between the coastal provinces and the more Western provinces (Demurger et al. 2002, Jones et al. 2003). According to one observer, the inequalities between

² In 1991 there were only 117 development zones in the PRC, but by 1992 that had mushroomed to 2,700, the overwhelming majority of which were independent initiatives by local authorities, from provincial governments to township governments. In the mid-1990s the government began to clean up the development zone scene, cancelling about 1,200 zones and returning more than 2 million mu of vacant land to agriculture (Deng and Huang 2004).

provinces in the PRC will lead to a rebellion as long and as arduous a struggle as the Civil War in the United States (Tyler 1995).

B. Theoretical Predictions

In the wake of globalization, a rich theoretical literature has developed to explain the changes observed in both developed and developing countries. This section examines how it may guide the analysis of the experience of the PRC's SEZs. Trade theory that examines the expected impact of the PRC's entry into global markets often begin with the standard insight of the Heckscher-Ohlin (H-O) model, which predicts that countries will specialize in goods that require a resource-abundant input good. In the PRC, cheap unskilled labor is a relatively abundant resource and developed economies, such as the United States (US), have a greater supply of other resources, such as capital and high-skilled labor. As predicted by the H-O model, in the wake of the PRC's liberalized trade policy, the US data reflect a decline in employment in industries that employ workers who perform "routine" tasks, and a concurrent increase in imports in these industries (Ebenstein et al. 2009). Insofar as routine tasks can be performed easily by foreign workers, and are easily monitored by multinational parent corporations (Grossman and Rossi-Hansberg 2009), it is logical to assume that SEZs will attract industries that require large numbers of low-skilled workers, thereby increasing demand for their services.

These models would suggest that increased relative demand for low-skilled workers in SEZs and other areas would raise the wages of unskilled workers, but they have more ambiguous predictions for the impact on high-skilled workers. Antras et al. (2006) argue that increased wage inequality in developing countries is a necessary implication of offshoring. They consider a one-sector, two-country model in which large declines in communications costs enable the formation of North-South teams. They argue that the "globalization" equilibrium, wherein Northern workers can team up with Southern workers at no additional expense, will lead to international teams in which Northern managers supervise teams of Southern workers. They predict in their model that wage inequality will be higher in the South following these changes: "Globalization improves the quality of managers with whom Southern workers are matched, thus raising the productivity of these workers, and thereby leading to an increase in the return to skill. This effect is reinforced by an occupational choice effect: more agents become workers, hence increasing the range of abilities in the worker distribution." This prediction fits the PRC's SEZ experience, as its rural population left agriculture and entered into production jobs in the SEZs. These models generate an unambiguous prediction that the return to skill will rise.

Another strand of literature has focused on firm productivity, and the potential for high-productivity multinational firms to create technology spillovers to domestic firms in these cities. In an influential paper, Melitz (2003) posits that only the most productive firms will engage in multinational activity, and that trade can lead to welfare gains if lower-

productivity firms are forced to exit the market. Indeed, empirical evidence suggests that this claim is borne out by the data (Helpman et al. 2004). In combination with evidence that domestic firms in the PRC are of lower productivity than American firms through poor capital allocation (Hsieh and Klenow 2009), it may be that the SEZs create an environment where domestic firms in the PRC are forced to either compete or exit the market. The ensuing data analysis will examine how SEZ status has affected the composition of firms, their productivity, and the wages of workers in these local labor markets.

III. Data

The data on the timing and location of SEZs are the first attempt to catalogue these events systematically.³ For each special zone, the year in which it was established, the special privileges associated with the zone, and the county in which it is located are recorded. The data covers six different types of zones: Special Economic Zones (SEZ), Free Trade Zones (FTZ), Coastal Open Cities (COC), Economic Technology Development Zone (ETDZ), Export Processing Zone (EPZ), and High Technology Development Zone (HTDZ). The principal focus is on the SEZs, FTZs, EPZs, and COCs as these provided much more substantial financial incentives to foreign multinational firms to enter the market. As shown in Figure 1, there was a proliferation of these special-status areas between 1985 and 1995, with a large number of special zones being established in the early 1990s after Deng Xiao Ping's visit to the South.

The firm data are taken from the 2003 Annual Survey of Industrial Production by the National Bureau of Statistics. The sample is composed of all nonstate firms with more than 5 million yuan in revenue (about \$800,000) plus all state-owned firms. The raw data consist of over 100,000 firms. Importantly, for each firm both ownership type and year of establishment are observed. As shown in Figure 2, foreign-firm entry rose precipitously in the early 1990s, following the expansion of SEZs and expanded incentives within existing zones. Summary statistics for the sample of firms are reported in Table 1.

³ These data are available for download at the author's website, matched to the PRC's 2000 census data at the 4-digit and 6-digit levels. See demog.berkeley.edu/~ebenstei/research/sez/datafiles/all_economic_zones_citygb.dta.

Figure 1: Geographic Distribution of Economic Zones in the People's Republic of China

Panel A: 1985



Panel B: 1995



Note: The figure displays all economic zones by prefecture in the listed year. The zones are special economic zones, free trade zones, economic technology development zones, export processing zones, and high-tech development zones.

Source: Author's calculations.

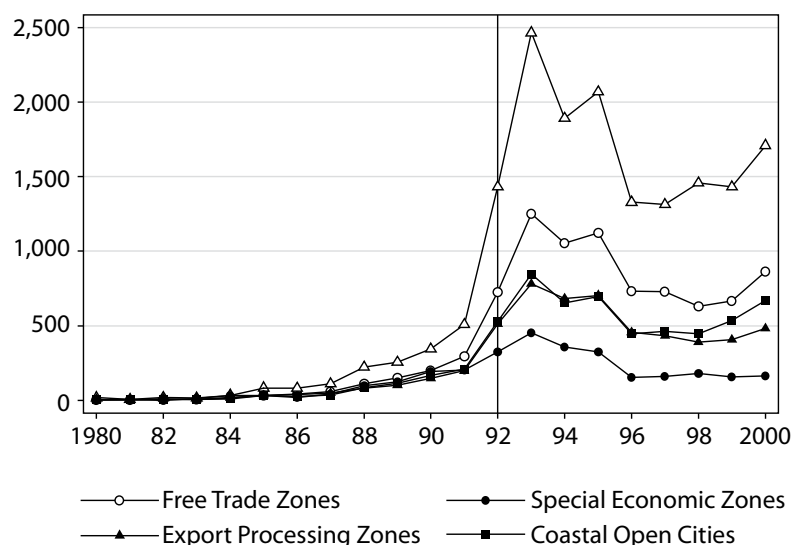
Table 1: Summary Statistics for Sample of Firms in Manufacturing, 2003

	Established Prior to Economic Zones (1950–1979)			Established After the Economic Zones (1980–2002)		
	Regular City (1)	Special Economic Zone (ever) (2)	Difference (2)-(1) (3)	Regular City (4)	Special Economic Zone (ever) (5)	Difference (5)-(4) (6)
Foreign Firm (1=yes)	0.01 (0.10)	0.02 (0.13)	0.00715* (0.004)	0.20 (0.40)	0.37 (0.48)	0.178*** (0.04)
Number of Employees (‘000s)	99.30 (784)	113.24 (864)	13.94 (19.44)	56.23 (365)	89.03 (766)	32.80*** (9.93)
Total Annual Sales (million yuan)	527.36 (1673)	460.54 (1717)	-66.82 (63)	233.45 (605)	245.65 (639)	12.21 (23)
Value Added (million yuan)	28.95 (229.69)	29.05 (212.81)	0.10 (5.06)	15.20 (94.46)	23.39 (229.57)	8.187*** (2.65)
Total Annual Profit (million yuan)	3.10 (57.03)	3.77 (57.02)	0.67 (1.20)	2.62 (29.71)	5.33 (90.41)	2.709*** (0.82)
Value Added per Worker (thousand yuan)	41.43 (98.88)	47.21 (83.08)	5.78 (4.90)	73.42 (244.11)	93.26 (246.66)	19.84*** (6.60)
Share of Annual Sales Paid in Wages	0.134 (0.14)	0.136 (0.14)	0.002 (0.01)	0.076 (0.08)	0.084 (0.09)	0.00774** (0.00)
Profit per Worker (thousand yuan)	1.554 (37.62)	2.310 (28.19)	0.756 (1.75)	11.079 (66.01)	17.065 (90.78)	5.986*** (1.98)
Special Economic Zone (1=yes)	0.00	0.00	0.00	0.00	0.69 (0.46)	0.691*** (0.09)
Observations	14,937	4,064		105,957	42,567	

Note: The sample is composed of all manufacturing firms in 2003 that have annual revenue greater than RMB5 million (\$800,000). The designation of a city as a special economic zone also includes cities that are free trade zones, export processing zones, or coastal open cities. The firms in columns 1 and 4 are located in cities without a special zone. Firms in columns 2 and 5 are located in cities with special economic status, or cities that would eventually be given special economic status. Statistics are reported using 2003 firm data, stratifying them by the year of opening.

Source: China Annual Survey of Manufacturing Firms (2003).

Figure 2: Foreign Firm Openings in the People's Republic of China, 1980–2000



Note: A vertical line is placed at 1992, the year in which Deng Xiao Ping visited the PRC's special trade areas and initiated additional autonomy and tax exemptions for foreign firms.

Source: China Annual Survey of Manufacturing Firms (2003).

Data on workers and their wages are drawn from the Urban Household Surveys (1988–2002). For each worker in the sample, age, sex, years of education, broad measures of industry and occupation, city, and monthly wage income are observed. The sample is restricted to those workers in the labor market: men aged 16–59 and women aged 16–55. Excluded from the sample are those who report being either retired or disabled. These data are matched by city to the sample of firms, and to the catalogue of SEZ status by county and year. Summary statistics are reported in Table 2. The analysis of the causal effect of foreign entry on local labor markets is based on the assumption that SEZ status assignment induces higher-productivity firms to locate in these areas, and this is exogenous to the existing composition of workers in the city. As shown in Table 2, the workers are quite similar in the two sets of cities—but workers in the SEZ cities are more likely to be working in a year X city cell with a zone in place.

Table 2: Summary Statistics for Sample of Workers in the PRC, 1988–2001

	Prior to Deng's Southern Tour (1988–1992)			After Deng's Southern Tour (1993–2001)		
	Regular City (1)	Special Economic Zone (ever) (2)	Difference (1)-(2) (3)	Regular City (4)	Special Economic Zone (ever) (5)	Difference (4)-(5) (6)
Log Wages	7.44 (0.58)	7.60 (0.57)	0.160*** (0.05)	8.75 (0.78)	8.97 (0.78)	0.220* (0.12)
Real Log Wages	7.00 (0.57)	7.14 (0.54)	0.144*** (0.04)	7.76 (0.83)	7.83 (0.76)	0.07 (0.18)
Age	36.67 (9.91)	37.18 (9.88)	0.511*** (0.21)	38.12 (15.48)	39.37 (15.15)	1.248*** (0.45)
Male (1=yes)	0.52 (0.50)	0.52 (0.50)	0.00 (0.00)	0.51 (0.50)	0.51 (0.50)	–0.00 (0.01)
Years of Education	10.60 (2.69)	10.73 (2.63)	0.14 (0.10)	10.15 (3.83)	10.45 (3.56)	0.30 (0.29)
Consumer Price Index	156.46 (17.17)	158.83 (15.80)	2.38 (1.87)	288.32 (70.73)	317.24 (37.31)	28.92 (20.09)
Value Added per Worker ¹	41.31 (19.73)	65.02 (17.09)	23.71*** (3.85)	66.55 (22.74)	77.55 (16.09)	11.01* (6.51)
Special Economic Zone (1=yes)	0.00 0.00	0.62 (0.49)	0.619*** (0.10)	0.00 0.00	0.85 (0.36)	0.852*** (0.08)
Observations	73,084	16,944		111,417	49,601	

¹Value added per worker is defined by taking the average among firms operating in the worker's city in a particular year, using the 2003 firm-level data set.

Notes: The designation of a city as a special economic zone also includes cities that are free trade zones, export processing zones, or coastal open cities. The workers and firms in columns 1 and 4 are located in cities without a special zone. Workers and firms in columns 2 and 5 are located in cities with special economic status, or cities that would eventually be given special economic status. The workers sample is restricted to individuals earning wage income among men aged 16–59 and women aged 16–55.

Sources: China Urban Household Survey (1988–2001), China Annual Survey of Manufacturing Firms (2003).

IV. Estimation Strategy

A. Firm Entry and Average Productivity in Special Economic Zones

The proposed mechanism for workers to benefit from an economic zone is that foreign firms are more productive on average, and their presence will induce increases in average productivity, which may then lead to higher wages. Since special zones attract foreign firms and higher-productivity domestic firms, of interest are the reduced form relationship between SEZ status and labor productivity, as well as the mechanisms behind a relationship. As a prelude, it is demonstrated that FDI and domestic firms (DOM) are drawn to an SEZ in city j in year t , after accounting for city and year fixed effects. Models can be estimated by regressions of the following form:

$$FDI_{jt} = \alpha + \beta_1 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{jt} \quad (1)$$

$$DOM_{jt} = \alpha + \beta_2 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{jt} \quad (2)$$

Next, the relationship between average firm productivity and the status of the city as a special zone is determined. Since the adoption of an SEZ may lead to foreign firm entry, it is anticipated that less productive firms will leave the market, and spillovers between foreign firms and domestic firms will lead to increased productivity. Labor productivity averages across firms by city and year are calculated; these are considered to be the primary mechanisms for an SEZ to attain better labor market outcomes. Since there are no data on firms for the period by year, 2003 data, which report the year the firm opened, are exploited. If firms in other areas “catch up”, this assumption will be conservative and understate the productivity improvement from having new firms enter the SEZ. The use of 2003 data for productivity measures by year is more plausible for foreign firms, which presumably implement best practices from mature foreign markets. However, if domestic firms in SEZs improve their productivity with a lag, labor productivity in any year may be measured incorrectly with this strategy.

The valued added per employee of all firms i already opened in city j is calculated as follows:

$$LP_j = \sum_{i=1}^{i=l} \frac{VA_i}{EMP_i}$$

These data are then averaged among all firms opened by year t in city j . This allows calculation of labor productivity and estimation of the reduced form relationship between labor productivity in city j and year t , after accounting for year and city fixed effects.

$$LP_{jt} = \alpha + \beta_3 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{ijt} \quad (3)$$

B. Firm Profits and Worker Wages in Special Economic Zones

Multinational firms, relative to their domestic counterparts, are more capital-intensive and have higher productivity (Hsieh and Klenow 2009). In combination with the tax advantages granted to these firms, their access to low-wage Chinese workers and high-price product markets in developed countries to increase the profits of firms in these cities can be anticipated. The extent to which workers share the benefits is an open empirical question. While standard microeconomic theory suggests that workers will earn their marginal revenue product, and that SEZ status will lead to higher wages, many fear that the surplus labor from rural areas will lead to firms holding an “upper hand” in wage bargaining. Of interest here are both the impact on corporate profits and the impact on workers' wages. Equations (4) and (5) estimate the reduced form relationship between firm profits, workers' wages, and SEZ status.

$$\Pi_{jt} = \alpha + \beta_4 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{jt} \quad (4)$$

$$w_{jt} = \alpha + \beta_4 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{jt} \quad (5)$$

Since equation (2) can be thought of as a first-stage equation for equation (5), there is need to estimate models of the following form, where fitted values from equation (2) and controls for individual characteristics X are used.

$$w_{ijt} = \alpha + \beta_3 \widehat{LP}_{jt} + \mu_j + \mu_t + X_{ijt} + \varepsilon_{ijt} \quad (6)$$

C. Returns to Skill, Wage Inequality, and Special Economic Zones

A voluminous theoretical literature on how foreign firm entry affects skill prices exists, but there is little real-world evidence. Here, models of the return to education within a city-year cell, and how it relates to conversion of a city to SEZ status are considered. To determine the impact on wage inequality, how individual-level wages are responsive to the presence of an SEZ, and whether these have led to increases in wage inequality, are examined. This includes impact of SEZ status on workers at the k th percentile of wages. An alternative strategy is to consider how skill prices themselves have changed, as proxied by years of education, in SEZ cities versus other cities. While the empirical analysis will only examine these issues in a descriptive manner, the models are presented for expository purposes.

$$w_{jt}^k = \alpha + \beta_6 SEZ_{jt} + \mu_j + \mu_t + \varepsilon_{jt} \quad (7)$$

$$w_{ijt} = \alpha + \beta_7 SEZ_{jt} \cdot Yrsed_{ijt} + \mu_j + \mu_t + X_{ijt} + \varepsilon_{jt} \quad (8)$$

V. Empirical Results

A. Firm Entry

Table 3 estimates equations (1) and (2) to examine the link between firm entry and SEZs. Focusing on SEZs, FTZs, EPZs, COCs and a variable, which is a combination of the four different zones, regression is run on a city's number of firm openings for each type of zone, with year and city fixed effects. The sample is the 345 distinct prefectures (or cities) for the period 1951–2002, yielding 17,940 observations (345 x 52). Columns 1–3 differentiate between foreign firm openings, domestic firm openings, and state-owned firm openings.

Table 3: Firm Entry in the PRC's Economic Zones

	Foreign Firm Openings (1)	Domestic Firm Openings (2)	State-Owned Firm Openings (3)
Any Zone	33.74*** (9.96)	21.56*** (7.37)	19.60*** (6.39)
Special Economic Zone	31.20** (12.93)	2.06 (2.66)	2.11 (1.45)
Free Trade Zone	80.36*** (25.39)	53.44** (21.43)	36.27*** (13.93)
Export Processing Zone	14.64*** (4.83)	22.15*** (7.21)	16.57*** (4.19)
Coastal Open City	25.77*** (7.94)	26.42** (10.29)	18.43** (7.70)

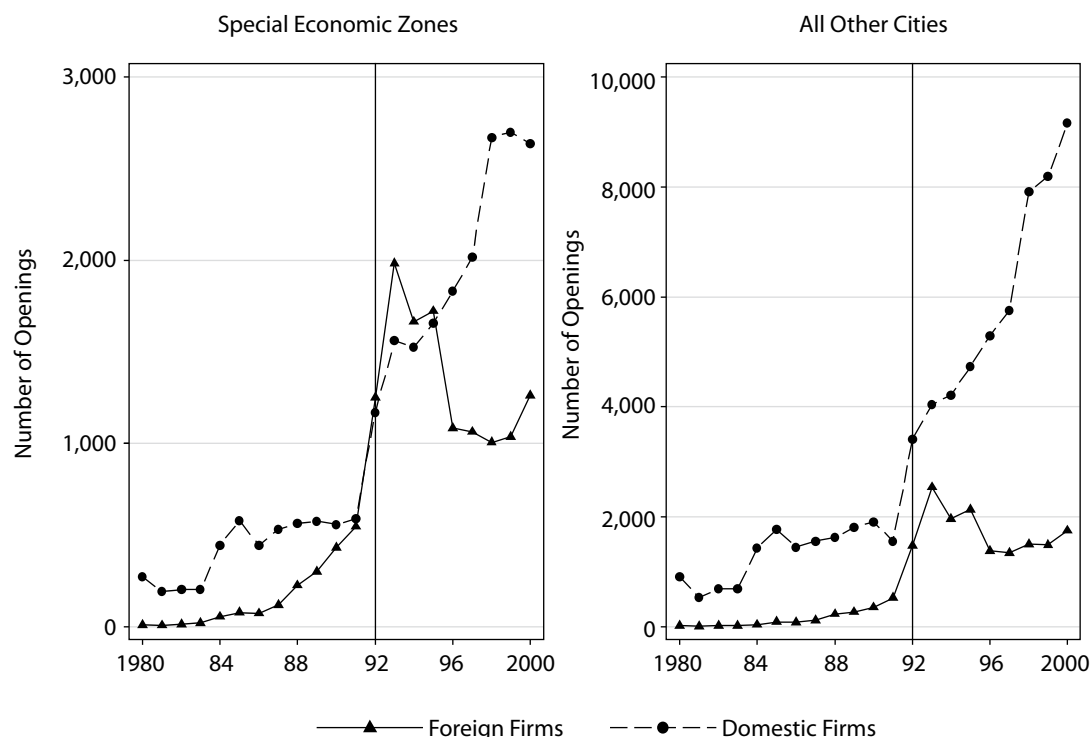
Note: N=17,940. Each observation is a city X year cell for the period 1951–2002 (345 x 52). Each cell in the table represents the coefficient from a separate regression. In each regression, a city's number of firm openings in a given year is regressed on the listed zone status. Each regression has year and city fixed effects. Standard errors are clustered at the city level.

Source: China Annual Survey of Manufacturing Firms (2003).

The results show a positive and statistically significant relationship between all types of firm entry and a city's status as an SEZ. Interestingly, the different types of economic zones had different effects on the entry of firms. As shown in row 1 of Table 2, the cities assigned to SEZ status had a strong impact on foreign firm openings (21.41) but a very small effect on domestic firm entry. As intended, these SEZ cities enabled foreign firms to produce goods in the PRC for export—but did not generate a large number of new domestic firms in these areas. In contrast, a city's assignment to FTZ status increased the number of foreign firm openings by 80.36 per year, and also resulted in an additional 53.44 new domestic private firms, and 36.27 state-owned firms. This is logical since FTZs were established to enable trading of intermediate goods between foreign and domestic firms. The results for EPZs and COCs are similar, with these areas generating a statistically significant number of new domestic and foreign firms.

These patterns are shown graphically in Figure 3, which tracks the expansion of firms in the SEZs and all other cities. The zones were characterized by rapid increases in the number of foreign firms, followed shortly thereafter by increases in the number of domestic firms. In nonzone cities, domestic firm openings have been consistently higher than foreign firm openings. As will be shown in the next section, foreign firms are on average more productive, implying that these differences could generate differences in profits and wages across cities.

Figure 3: Foreign and Domestic Firm Entry into the PRC's Cities



Notes: A vertical line is placed at 1992, the year in which Deng Xiao Ping visited the PRC's special trade areas and initiated additional autonomy and tax exemptions for foreign firms.

Source: China Annual Survey of Manufacturing Firms (2003).

B. Productivity, Profits, and Aggregate Wages

Table 4 estimates equations (3), (4), and (5) to examine the link between economic zones and several measures of economic performance for cities that are assigned special status: total employment, value added per worker, profit per worker, and wages per worker. These outcomes are regressed on a city's zone status in a particular year, including in all models year and city fixed effects. Unfortunately, there is no access to data for the entire sample period (1951–2002) that would reliably account for economic performance at the subnational level. Hence, the 2003 firm survey is used to construct a

data set that has the year of opening, and which generates a distribution of firms by city in each year. This heroically assumes that firms operate at their 2003 levels, with no exit and entry. This is an attempt to analyze what types of firms entered cities before and after the SEZ assignment, and in the absence of data for the period, constitutes a reasonable proxy for the composition of firms by city and year during the period. While it is assumed that firms neither exit nor enter, the data set is only for firms that are sufficiently large (with greater than 5 million RMB in annual sales), and so this sample is presumably less volatile than a sample aimed at small businesses. Also, while it is not ideal to assume that firms operated at their current levels of productivity, this may be a conservative assumption for the purpose of evaluating whether there are productivity differences between domestic and foreign firms. If foreign firms provide technology spillovers to domestic firms, assuming domestic firms operate at their 2003 levels will presumably *understate* the true productivity differences between the sets of firms.

Table 4 uses this “pseudo-panel” data to estimate the reduced form relationship between zone status and the aforementioned economic performance measures, with the models estimated using both levels (columns 1–4) and logs (5-8) for the dependent variables. It is worth noting that since this is imputed data, the magnitudes have no real “units”. However, the analysis still can speak to whether zone status was associated with differential firm performance. Column 1 indicates that there is a positive and significant relationship between being an economic zone and total employment for all of the zones. The data indicate that the FTZs generate the largest increase in employment (336,888) and coastal open cities the smallest (130,101), and both estimates are statistically significant at the 1% level. Columns 2 and 3 indicate similar increases in value added per worker and profit per worker, which suggests that the firms entering in response to a city having special status were more productive than incumbent firms. As shown in the table, the existence of any zone is associated with a 59% increase in total employment and a 74% profit per worker.⁴ However, as shown in column 4, there is no reported increase in wages per worker in these cities. None of the zones experienced a large increase in wages per worker, as reported by the firms themselves. This seems to indicate that the main benefactors of the increased productivity from firm openings and economic zones were the corporations, not the workers. The results indicate that the zones increased the scale of industry and the number of jobs in manufacturing, but had very modest impacts on worker compensation rates. It is worth noting, however, that the extra employment may have allowed rural workers to relocate from farming into industry. If industry pays higher wages, the results may understate the welfare benefit to the PRC of having SEZs. However, these results do suggest that the assignment of zones did not translate into higher wages for workers.

⁴ Note that the log specification will delete firms that had negative or zero profits.

Table 4: Employment, Value Added, and Profit in Cities with Economic Zones

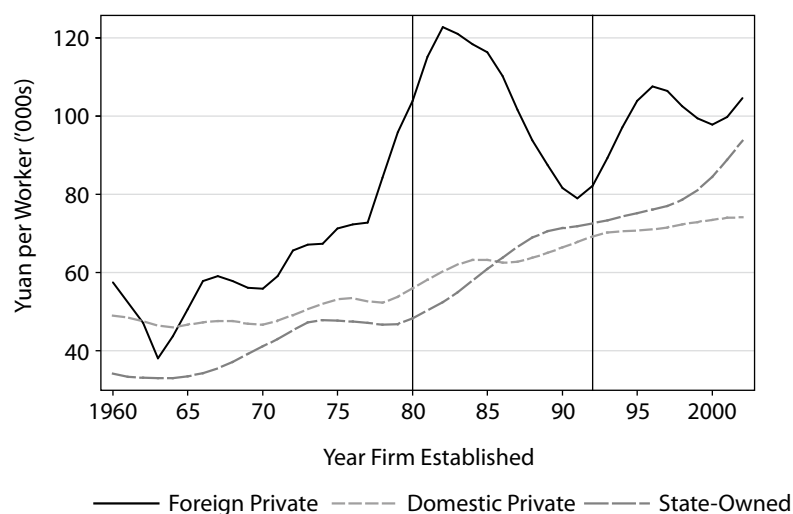
	LHS: Levels				LHS: Logs			
	Total Employment (1)	Value Added per Worker (2)	Profit per Worker (3)	Wages per Worker (4)	Total Employment (5)	Value Added per Worker (6)	Profit per Worker (7)	Wages per Worker (8)
Any Zone	170,359*** (40,779)	17.65*** (4.48)	5.510*** (1.31)	0.63 (0.71)	0.587** (0.28)	0.07 (0.09)	0.738*** (0.15)	0.00 (0.06)
Special Economic Zone	155,481* (87,431)	33.61*** (9.56)	6.687*** (2.33)	2.67 (2.88)	2.202** (0.92)	0.394*** (0.13)	0.910*** (0.26)	0.20 (0.21)
Free Trade Zone	336,888*** (101,340)	11.11 (7.10)	6.529** (3.18)	0.20 (0.71)	0.500*** (0.19)	-0.06 (0.14)	0.681** (0.29)	-0.05 (0.06)
Export Processing Zone	241,742*** (59,245)	13.83*** (4.35)	6.213*** (1.51)	-0.45 (0.35)	-0.17 (0.16)	-0.07 (0.07)	0.664*** (0.14)	-0.123*** (0.03)
Coastal Open City	143,404*** (45,095)	12.32** (5.58)	4.113*** (1.44)	-0.04 (0.60)	0.30 (0.19)	-0.03 (0.12)	0.643*** (0.21)	-0.05 (0.06)

Note: N=17,940. Each observation is a city X year cell for the period 1951–2002 (345 x 52). Each cell in the table represents the coefficient from a separate regression. In each regression, the listed zone status is regressed on a city's aggregate employment, value added per worker among firms, or profit among firms. Each regression has year and city fixed effects. Standard errors are clustered at the city level. The sample used in this table is constructed by creating a pseudo-panel of firm averages across cities and years by exploiting the firm's year of establishment and creating a set of firms thought to be operating in a given city and year. It is assumed that the firms operate at 2003 levels of productivity, profit, employment, and wage levels in all years.

Source: China Annual Survey of Manufacturing Firms (2003).

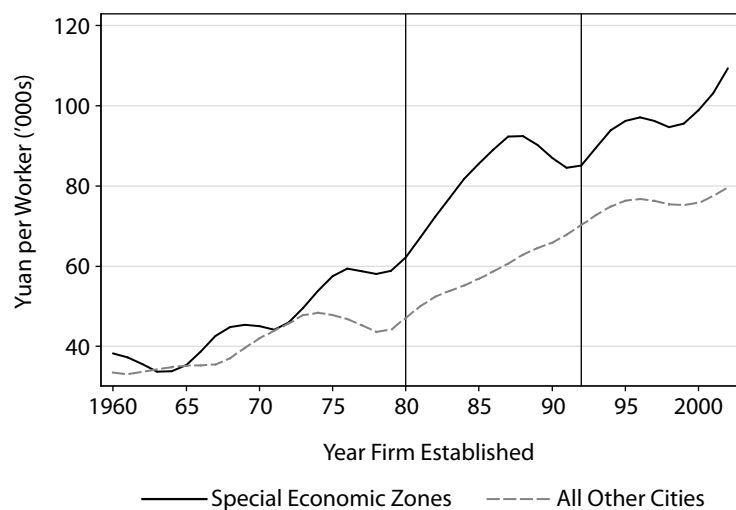
Figures 4 and 5 confirm graphically that firm productivity was higher in the economic zones (SEZs, FTZs, EPZs, COCs) than in other cities. As shown in Figure 4, when firms are stratified by the year in which they were established and by foreign or domestic ownership, foreign firms are more productive than domestic firms, a difference persisting throughout the sample period. However, the figure does indicate that the productivity gap between the different types of firms is narrowing—which may indicate a technology spillover between foreign firms and domestic/state-owned firms. In light of the productivity difference between foreign versus domestic firms, Figure 5 presents differences in productivity between SEZs and other cities. Cities with SEZs experienced an average firm productivity increase from 60,000 yuan per worker in 1980 to 110,000 Yuan per worker in 2003, whereas growth in productivity was more sluggish in others cities, increasing from 50,000 Yuan in 1980 to 80,000 Yuan per worker in 2003. These results suggest that a widening gap has emerged between firms in the zones versus other parts of the country. Whether this productivity improvement has induced an improvement in the real wage paid to workers is examined further.

Figure 4: Trends in Productivity by Ownership Type



Note: The sample is composed of all firms with greater than RMB500,000 in 2003. The graph is created using lowess smoother with bandwidth .20 on annual averages of value-added per employee in special zones versus all other cities. The special zones include special economic zones, free trade zones, export processing zones, and coastal open cities. Vertical lines are placed to indicate (i) the establishment of special economic zones in 1980, and (ii) the expansion of zones and their privileges in 1992 following Deng Xiao Ping's visit to the South.

Source: China Annual Survey of Manufacturing Firms (2003).

Figure 5: Trends in Productivity: Economic Zones and All Other Cities

Notes: The sample is composed of all firms with greater than RMB500,000 in 2003. The graph is created using lowess smoother with bandwidth .20 on annual averages of value-added per employee in special zones versus all other cities. The special zones include special economic zones, free trade zones, export processing zones, and coastal open cities. Vertical lines are placed to indicate (i) the establishment of special economic zones in 1980, and (ii) the expansion of zones and their privileges in 1992 following Deng Xiao Ping's visit to the South.

Source: China Annual Survey of Manufacturing Firms (2003).

C. Wage Effects and Responses to Inequality

Table 5 estimates equations (4) and (5) to examine the link between average labor productivity and wages, with a focus on how the productivity boost generated by SEZ status leads to higher wages. Both ordinary least squares and two-stage least squares models are used to estimate these separately for all workers (column 1), manufacturing workers (column 2), and nonmanufacturing workers (column 3). All regressions include year fixed effects and province fixed effects.⁵ A rich set of demographic controls including age, age squared, years of education, and sex, isolate the impact of firm composition in the city on the compensation of workers.

⁵ While ideally, city fixed effects are included, data on workers before and after the rollout of zones are insufficient to estimate stable models with city effects. The results should therefore be interpreted with caution, as city-specific factors that affect wages cannot be accounted for.

Table 5: OLS and 2SLS Models of the Impact of Average Labor Productivity on Wages Using SEZ Status as an Instrument

	Dependent Variable: Real Log Wages		
	Overall (1)	Manufacturing (2)	Other (3)
Panel A: Reduced form OLS models of real log wages on a city's SEZ status			
City is an SEZ (1=yes)	0.09 (0.07)	0.08 (0.08)	0.09 (0.07)
R-squared	0.51	0.46	0.55
Panel B: OLS models of real log wages on log of average labor productivity			
Log of average labor Productivity	0.203 *** (0.04)	0.234 *** (0.05)	0.195 *** (0.04)
R-squared	0.52	0.47	0.56
Panel C: OLS models of log of average labor productivity on SEZ status			
City is an SEZ (1=yes)	0.235 ** (0.09)	0.221 ** (0.09)	0.243 ** (0.10)
R-squared	0.58	0.59	0.58
Panel D: 2SLS models of real log wages on log of average labor productivity using SEZ status as the instrumental variable			
Log of average labor Productivity	0.37 (0.22)	0.38 (0.30)	0.370 ** (0.17)
R-squared	0.51	0.46	0.55
Demographic controls	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes
Observations	137,320	51,540	85,780

OLS = ordinary least squares, SEZ = special economic zone, 2SLS = two-stage least squares.

Note: Each cell in the table represents the coefficient from a separate regression. Our designation of a city as a Special Economic Zone also includes cities that are Free Trade Zones, Export Processing Zones, or Coastal Open Cities. Average labor productivity is measured among all firms that were operating in the city in the year, assuming they were operating at their 2003 levels of productivity. The sample is restricted to individuals with wage income. Demographic controls for age, age squared, years of education, and sex are suppressed. Standard errors are clustered at the city level.

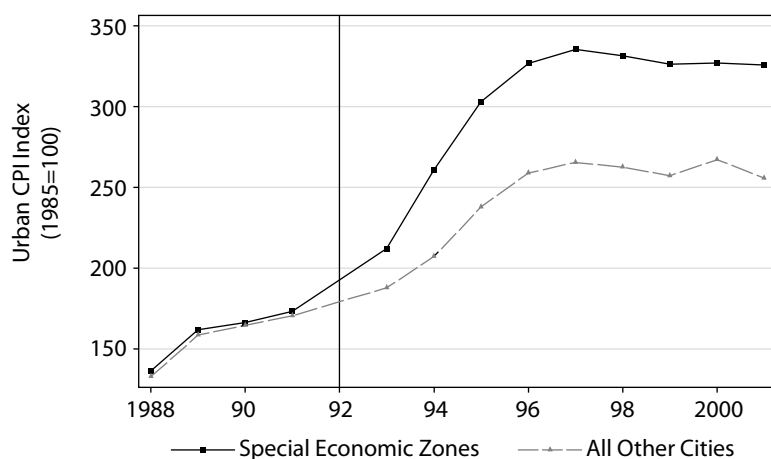
Source: China Urban Household Survey (1988–2001), China Annual Survey of Manufacturing Firms (2003).

As shown in Panel A, workers in SEZs are paid somewhat better than workers in other cities. These workers enjoy an 8–9% premium in real wages, but the difference is not statistically significant. Upon examination of the relationship between wage rates and labor productivity, as proxied by value added per worker among the manufacturing firms in the sample, Panel B shows a robust relationship between wage rates and the log of average productivity among firms in the city, with a 1% increase in average productivity increasing real wage rates by 0.2%. This is statistically significant at the 1% level for manufacturing and nonmanufacturing workers, suggesting a spillover into other sectors of the economy. However, it is worth noting that this relationship may be endogenous. If workers who are more productive sort into cities with more productive firms, it may be that the causal link is more modest. Alternatively, if productivity is poorly measured relative to wages, it may be that the relationship is even stronger than the findings. Panel

C and D examines the link between average firm productivity and wage rates exploiting the SEZ status of a city. Panel C reports the first-stage results, where a city's average productivity is regressed on its status as an SEZ. SEZ status increases productivity by 23.5% among firms, significant at the 5% level. Using the fitted values from this regression to examine the relationship between average productivity and real wages, workers are rewarded with 37% of the increase in average labor productivity, leaving 63% presumably to firms. However, these estimates are imprecise and statistically insignificant. While the results are not definitive, they suggest that workers have received at most one third of the increase in firm productivity in increased wages. In combination with evidence from firms that SEZ status *is* associated with increased firm productivity and firm profitability but *is not* associated with a higher share of revenue going to wages, it can be concluded that firms have not passed on the increased productivity to their workers. Poor bargaining power among workers due to large numbers of surplus labor in rural areas of the PRC has led to a situation in which economic expansion leads to *more* jobs but not necessarily *better paying jobs* within these cities in real terms.

Figure 6 indicates that one mechanism for tepid growth in real wages in the SEZ areas was the rapid increase in prices. The figure indicates that from 1988 to 2001, the urban consumer price index rose from a level of 100 in 1985 to 350 by 2001, a stunning 250% increase. The price increase was slightly more modest in other cities, reaching 250 in 2001. The rapid increases in prices suggest that the workers and consumers were not able to enjoy fully the fruits of the PRC's expansion. In particular, if SEZs attract foreign firms, and this leads to higher prices but no increases in the real wage, the welfare impacts of these policies are ambiguous.

Figure 6: Trends in Prices: Special Economic Zones and All Other Cities



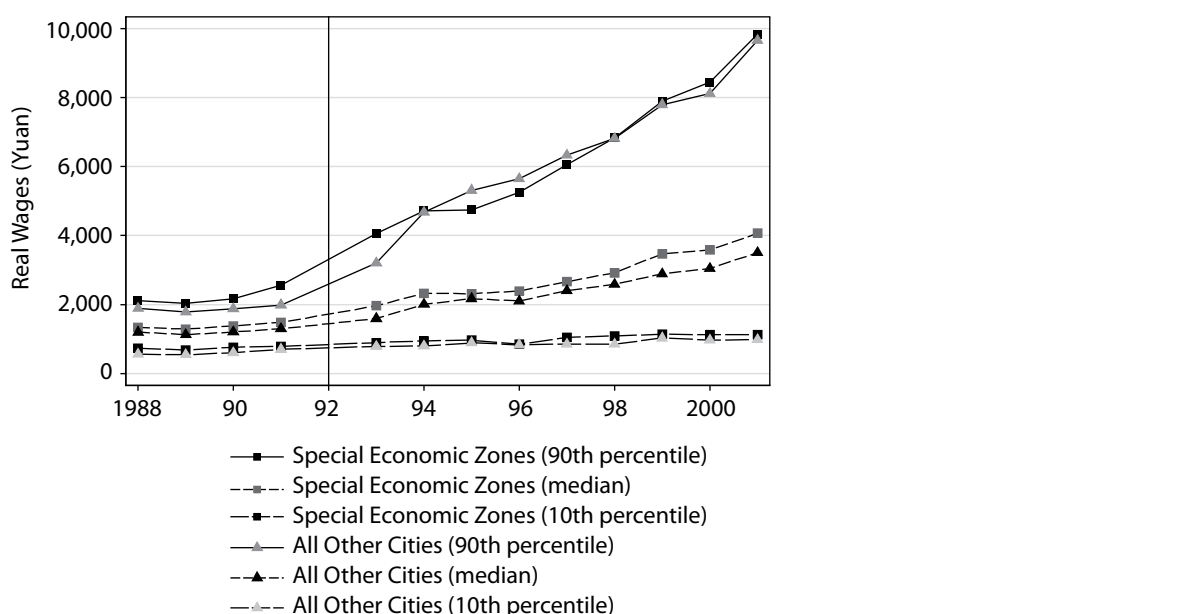
CPI = consumer price index.

Note: The sample is composed of all workers. The urban CPI is available by province and year, and assigned to the workers in the sample. A vertical line is placed at 1992, the year in which Deng Xiao Ping visited the PRC's special trade areas and initiated additional autonomy and tax exemptions for foreign firms.

Sources: Chinese Urban Consumer Price Index (1988–2001), China Urban Household Survey (1988–2001).

This possibility is highlighted by Figure 7, which indicates that among the sample of workers, little difference is observed in wage trends between SEZs and all other cities. From 1988 to 2001, the pace of increase of worker's wages has remained similar in the two groups, despite the productivity gap between firms in SEZs versus other cities. In addition, the figure suggests a dramatic increase in inequality for both SEZs and other cities.⁶ In 1988, while the gap between the 90th percentile and the 10th percentile for real wages was less than 2000 Yuan (in 1985 units), the difference in 2002 was nearly 10,000 Yuan. If the PRC's economic boom is generating a windfall for firms but large increases in inequality, it is unclear whether the growth will generate welfare improvements for majority of the population.

Figure 7: Trends in Real Wages: Special Economic Zones and All Other Cities



Note: The sample is composed of all workers. A vertical line is placed at 1992, the year in which Deng Xiao Ping visited the PRC's special trade areas and initiated additional autonomy and tax exemptions for foreign firms.

Source: Chinese Urban Household Surveys (1988–2001).

The combination of rising inequality and anemic wage growth while corporate profits have surged is a potential recipe for unrest or at least dissatisfaction. This possibility is investigated in Table 6. The results indicate that workers in SEZs are more likely to believe the city's income distribution is "very unfair". Workers in SEZ cities are 2.67 percentage points more likely to characterize the city as such, which is a 10% increase over a 30% sample mean (who report the city's wage distribution is very unfair). Almost no difference by gender is observed but a large gap by income and education is

⁶ Quantile regressions as an analogue to this figure are also estimated. The results indicate no significant gap between SEZ cities or non-SEZ cities at various points in the wage distribution. The results are available upon request.

exhibited. A 10% increase in log wages is associated with a 6 percentage point decline in the probability of perceiving the wage distribution as unfair, or a 20% decline. The table also indicates that the SEZ status of a city is associated with the belief that the wage distribution is unfair only among those with less than a high school degree. Being young (under 40) and having more education are both negatively correlated with the perception that a city's income distribution is unfair. This suggests that young and highly educated workers perceive a fair return to education, and are therefore less likely to feel that the city's income distribution is unfair.

Table 6: Perception of Fairness of Income Distribution, Chinese Workers (2002)

	Dependent Variable: Is the city's income distribution very unfair? (1=yes)		
	Overall (1)	Less than HS Education (2)	HS Graduates (3)
Sample Average			
City is an SEZ (1=yes)	0.0267** (0.013)	0.0457*** (0.017)	0.000 (0.019)
Sex	0.0049 (0.012)	0.0087 (0.017)	0.0047 (0.018)
Log wage	-0.0620*** (0.009)	-0.0511*** (0.012)	-0.0669*** (0.014)
Communist Party member (1=yes)	-0.002 (0.012)	0.0316* (0.018)	-0.022 (0.017)
Observations	6,581	3,722	2,859
R-squared	0.013	0.011	0.013

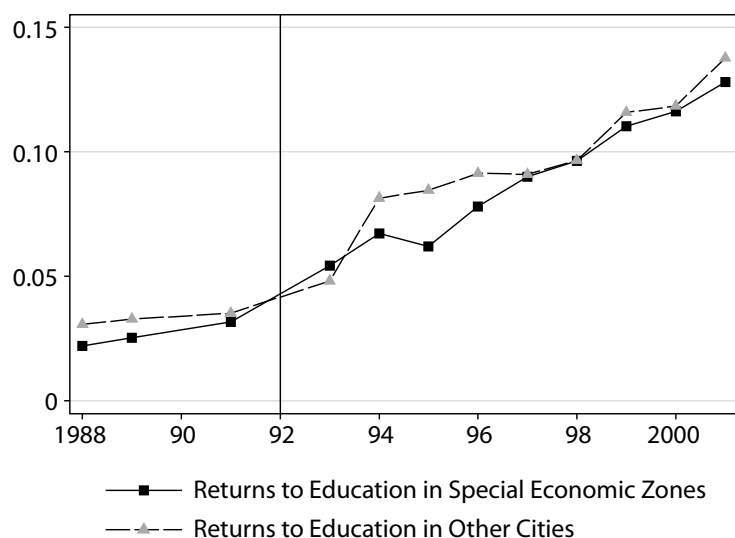
HS = high school, SEZ = special economic zone.

Note: SEZs include cities that are free trade zones or export processing zones. The sample is restricted to household heads. Also include are controls for age and age squared, which are suppressed. Standard errors are robust.

Source: China Household Income Survey (2002).

Figure 8 provides evidence in favor of this hypothesis. The figure indicates rapid increases in the returns to education in the PRC, with the return rising from 3% to 4% in 1988 to almost 14% in 2001. These trends are similar, however, in both SEZs and all other cities. While it is not possible to identify noticeable gaps in the return to education in the two areas, it may be that the PRC's foreign firms have generated an increase in the return to skill, but the effect is felt across the PRC rather than in a specific set of labor markets. This topic could be an area for future work, though it is clear that rapid increases in skill prices in combination with rising price levels could have important welfare implications and lead to declining purchasing power among the PRC's least skilled workers.

Figure 8: Trends in Returns to Education: Special Economic Zones and All Other Cities (percent)



Notes: The sample is composed of all workers. For each year, log wages are regressed on a worker's years of education, age, age squared, and sex. The figure reports the coefficient on years of education among workers in special economic zones and other cities. A vertical line is placed at 1992, the year in which Deng Xiao Ping visited the PRC's special trade areas and initiated additional autonomy and tax exemptions for foreign firms.

Source: Chinese Urban Household Surveys (1988–2001).

VI. Conclusion

This paper examined the impact on both firms and workers of assigning a city special economic zone status. While these areas have been hailed as a model for other Asian countries looking to capitalize on globalization and access to foreign markets, the Chinese experiment proves there are both winners and losers. Foreign multinationals raise employment levels in manufacturing, and both foreign and domestic firms in these cities experience rising productivity as well as rising profitability. However, the record is more modest with regard to generating high-paying jobs for workers. No evidence is found that average wage rates have increased in SEZs relative to other cities, in spite of large increases in average productivity of firms in these areas. In fact, since the zones have been characterized by rising prices, the welfare implications for residents of these cities are ambiguous. While the SEZs have provided the opportunity for millions of rural workers to find urban employment, these areas have not yet experienced real wage growth.

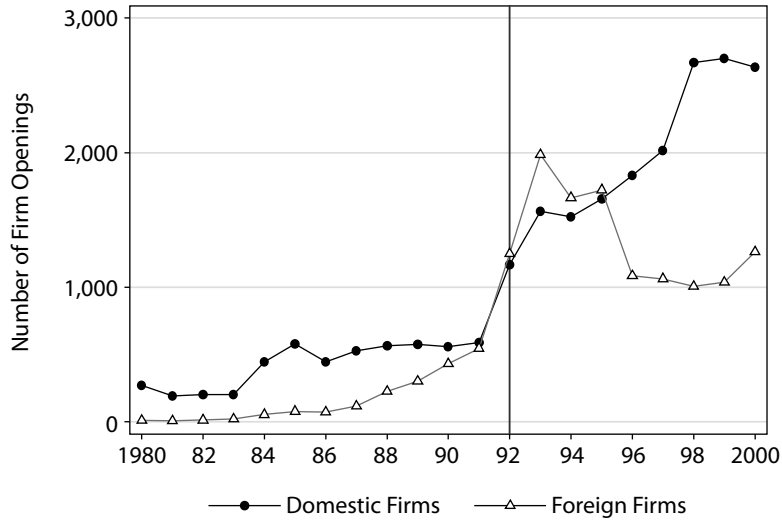
As the PRC's economy matures, it stands to reason that workers will increase their bargaining power, and that increases in productivity will induce real wage increases. In the short run, however, policy makers should consider measures that prevent workers

from poor rural areas having a “race to the bottom”, where firms can pay individuals subsistence wages and capture the lion’s share of the benefits to trade. Inequality within the PRC’s cities is also a potential trigger for social unrest. Recent riots by low-wage workers suggest that the status quo is problematic, as workers complain of unscrupulous managers and corrupt local officials.⁷ Future policy should be designed with the strategy of promoting growth but also providing a framework for establishing standards of worker compensation and protection that will generate robust growth and a fairer distribution of the benefits of trade.

⁷ See edition.cnn.com/2011/WORLD/asiapcf/06/17/china.riot.town.yoon/index.html?hpt=hp_t2.

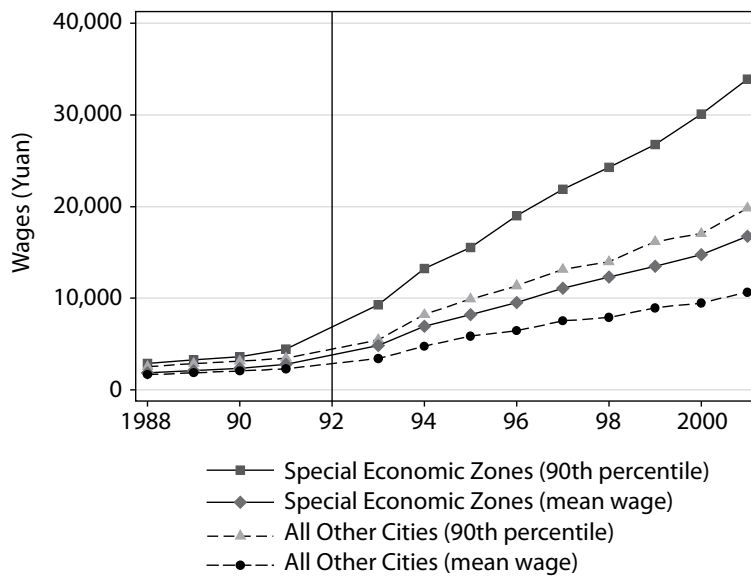
Appendix

Appendix Figure 1: Firm Openings in the PRC's Special Economic Zones



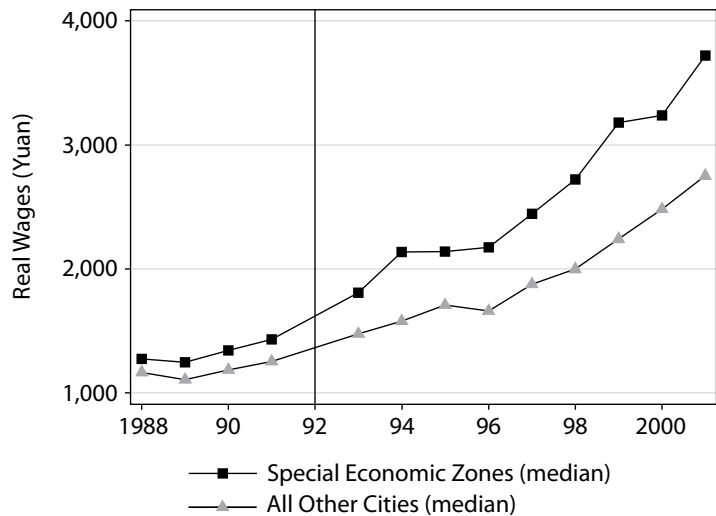
Source: Author's calculations.

Appendix Figure 2: Trends in Nominal Wages: Special Economic Zones and All Other Cities



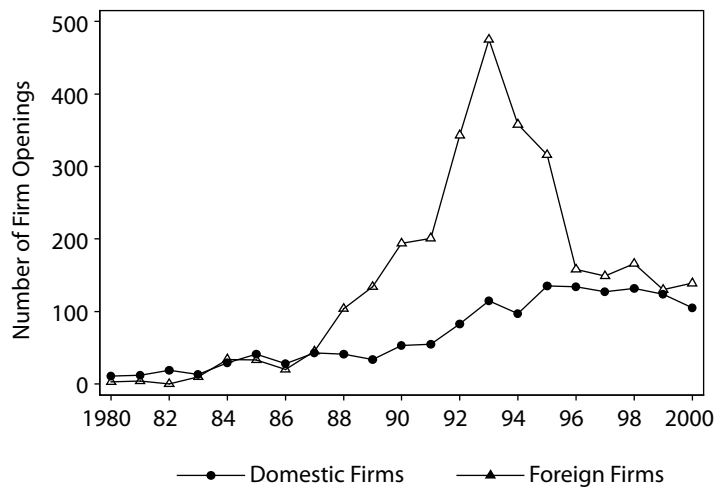
Source: Author's calculations.

Appendix Figure 3: Trends in Real Wages: Special Economic Zones and All Other Cities



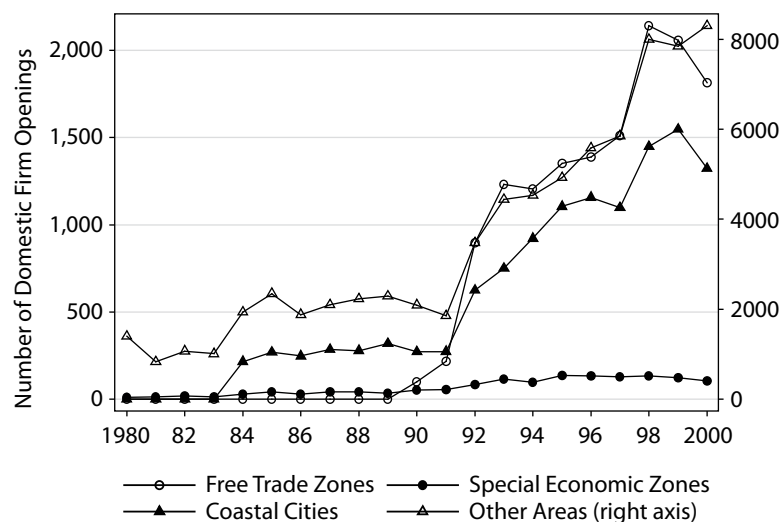
Source: Author's calculations.

Appendix Figure 4: Firm Openings in Special Economic Zones



Source: Author's calculations.

Appendix Figure 5: Domestic Firms Openings over the Years



Source: Author's calculations.

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About the Paper

Avraham Ebenstein examines the success of the People's Republic of China's special economic zones (SEZ) at attracting high-productivity firms and whether this has led to higher wages for workers. The paper finds that the SEZ experiment effectively attracted foreign capital and high-productivity domestic firms. However, the results indicate modest real wage gains for workers, suggesting firms have captured majority of benefits of SEZs through higher profits.

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6 ADB Avenue, Mandaluyong City
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www.adb.org/economics
ISSN: 1655-5252
Publication Stock No.

October 2011