A Tale of Two Countries: 
Openness and Growth in China and India

Chee Kian Leong
Nanyang Technological University
Nanyang Avenue
Singapore 639798

Email: leong_chee_kian@pmail.ntu.edu.sg

Abstract
The policy by China and India to open their markets to international trade has been touted as the reason for their phenomenal growth. This paper investigates the impact of opening up the China and Indian economy on economic growth in these countries using new panel data sets for both the national economies and the regional economies of China. The policy change to a more liberalized economy is explicitly identified using instrumental variables. The results provide support that export growth does have a positive and statistically significant effect on economic growth in these countries. However, the growth rates of these countries are export and FDI inelastic, in the sense that a one percentage point increase in growth rate of export or FDI will have a less than one percentage point increase in economic growth rate of these countries. In the case of the Chinese regions, the presence of export processing zones may exert positive effect on the regional growth rate but the increase in regional growth is even more export inelastic than at the national level. The results dispel the popular view that adopting a policy of more openness in the economy has a “multiplier” effect on economic growth. Of the two phases of liberalization in both countries, the second stage is statistically significant. One possible reason is that the scale of liberalization is greater in the second phase. Additionally, increasing the number of SEZs has very negligible effect on economic growth. Taken together, these results suggest that what contributes to greater growth is a greater scale of liberalization, rather than increasing the number of SEZs.

The author is grateful to Yothin Jinjarak and Jinyu for their suggestions, particularly on the sources of the data. He would also like to thank seminar participants at Nanyang Technological University for their comments and suggestions. The usual caveat applies.
1. Introduction

According to World Bank estimates, the real GDP grew at an annual average rate of 10% in China and 6% in India during these last two decades. No country in the world had as rapid growth as China whereas fewer than ten countries exceeded the Indian growth rate. A large part of this phenomenal success has been attributed to the liberalization taken by both countries. In fact, China and India have become the poster boys for the World Bank and other international organization in advocating that trade liberalization leads to economic growth.

When China opened her doors to world trade in 1980, an important aspect of her liberalization is the setting up of Special Economic Zones (SEZs) or export processing zones (EPZs). China’s SEZs are intended to serve as test beds for implementing capitalism to the rest of the country. This has been so eloquently described by Deng Xiaoping as “crossing the river, feeling the stone one at a time”. The phenomenal growth performance of China in the succeeding years has often been attributed to her success with these SEZs. Krugman and Obstfeld (1991, p247), for instance, asserted that Chinese economic growth in the 1980s amounted to “a classical demonstration of the potential of export-oriented industrialization”.

China is not the first country to employ SEZs or EPZs. Other East Asian countries such as Hong Kong, Singapore, Taiwan, South Korea and India have employed similar strategies before China. The spectacular success in economic growth performance for Hong Kong, Singapore, Taiwan, South Korea have also been attributed to the use of EPZs as export promotion growth strategies. On the other hand, it is interesting and important to note that India was the first in Asia to set up an EPZ in Kandla in 1965. Yet being the first mover has conferred little advantage to India: her economic growth performance has been comparatively lackluster to the East Asian Miracles. Despite the EPZs, India adopted heavily protectionist policies which have seen its share of world trade declined from 2% in the 1950s to less than 0.5% in the 1980s. Hence, although liberalization of trade is associated with SEZs and EPZs, this is not always the case. It remains to examine whether the setting up of SEZs and EPZs contributes significantly to the rapid economic growth of these countries as claimed.
The importance of understanding this question cannot be understated. Given the sterling performance of China, many other developing countries have attempted to emulate the Chinese blueprint of success by setting up EPZs and SEZs in the hope of replicating China’s phenomenal success. Chief amongst this is India, which introduced its Special Economic Zones policy, modeled closely after the Chinese. As of 2007, more than 500 SEZs have been proposed in India, out of which 220 have been approved. Other countries, such as Iran, Jordan, Poland, Kazakhstan, the Philippines, Russia, and Ukraine, have also pursued similar strategies. The staggering increase in the proliferation of such zones is a cause of concern for two reasons. Increasingly, one associates trade liberalization with the setting up of such zones. As is clear from the example of India, the establishment of EPZs and SEZs may not necessarily translate into liberalization of trade. Thus, such a strategy may not lead to full liberalization as expected and may possibly deterred governments from adopting more critical policies to liberalize their economies. Secondly, the increase in number of such zones leads to keener global competition for foreign direct investment (FDI). Unless FDIs can expand rapidly to accommodate the increase in number of such zones, the contribution of such export activities in these zones to the national output will be subjected to a shrinking pie.

Therefore, an important purpose of this paper is to understand special economic zones as a liberalization and growth strategy. The first step to answering this question is to establish whether pursuing liberalization through SEZs actually promotes economic growth. On this issue, however, both the theoretical and empirical literatures are sparse. On the theoretical side, Hamada (1974) is the pioneering study which presents a framework to analyze the welfare effects of such zones. Using the standard Ricardo-Viner 2-factors, 2-commodities trade model, he demonstrates that in the absence of foreign direct investment (FDI), the establishment of such a zone does not affect production if the protection is in the form of import tariff and increasing FDI in such zones does not necessarily improve the consumption possibilities available to the developing countries. Thus, foreign investment in such a zone has an immiserisation effect and therefore establishing such a zone results in a welfare loss. Many extensions
and qualifications of this result are reviewed in Schweinberger (2002), who points out the many special assumptions and the lack of a unified framework and clear conclusions.

On the empirical side, Wong and Chu (1984) presents a qualitative evaluation of the performances of several export processing zones and special economic zones in terms of attracting foreign direct investment, earning foreign exchange, export growth, employment generation, transfer of technology, backward and forward domestic linkages and regional development. Despite its ambitious agenda, the lack of data, however, prevents a comprehensive empirical analysis of all these aspects. Since then, a World Bank working paper (Madani, 1999) on Free Economic Zones (FEZs) presents a number of examples of FEZs and detailed description of organizational structure but goes no further. A number of other studies on China’s SEZs policy (Ge, 1999 and Park, 1997) focus on detailed descriptions of the SEZs in China. Kundra (2000) compared the characteristics of EPZs in India with the characteristics of SEZs in China. Wei (1993) employ a city-level analysis, based on data from 1980-90 and “found some clear evidence that during 1980-90 more exports are positively associated with higher growth rates across Chinese cities. In the late 1980s, the contribution of growth comes mainly from foreign direct investment.” To data, however, there has been no detailed panel study of SEZ as liberalization and growth strategies at both the national and regional level. This paper is thus the first attempt at such an analysis.

The case of using SEZ as both liberalization and growth policies presents another challenge for empirical analysis. Currently, analysis of the relationship between openness and economic growth employ export to GDP ratio as a measure of openness. Lardy (1992) has pointed out that smaller countries tend to have higher ratios whether their government pursue liberalization policies or not. Therefore, a serious shortcoming of this measure is that it measures the level of openness but does not capture the policy by a government to liberalize its economy. Moreover, it confounds both the effect of liberalization and that of SEZs. This is a shortcoming that we address in this paper by using both a policy dummy variable to denote the shift in policy towards openness and the number of SEZs or EPZs to obtain instrumental estimates of effect of export on income growth. Because China and India adopted free trade policies in SEZs but did not necessarily liberalize their domestic markets, SEZs as a liberalization policy are unlikely
to be correlated with factors omitted from the income equation. Hence they can be used to identify the impact of trade.

The first part of the study focuses on the analysis of the panel data for China and India before and after they liberalize their markets. We focus on China and India because there was a deliberate and discernable change in the policy towards openness. For China, these were the years 1980 and 1991, while for India these were the years 1991 and 2001. The distinct change enables us to analyze the effects of a deliberate change in policy towards openness on economic growth.

The second part of the study probes deeper into the relationship at the state level. We were able to obtain data for Chinese regions and data for Indian regions with EPZs. The analysis of these new data contributes some interesting new insights into the role of SEZs and EPZs in regional growth.

This paper is organized as follows: Section 2 presents an overview of the SEZs in China and India, with recent developments. Section 3 describes the data and the empirical framework. Section 4 presents the results of the empirical tests and discusses the results. Section 5 discusses the policy implications of the results. We consider whether SEZs have a multiplier or immiserizing impact on economic growth and question whether increasing the number of SEZs will have substantial effect on growth rate. Finally, section 6 concludes and proposes some possible directions for future research.

2. Special Economic Zones in China and India

Special economic zones (SEZs) are localities with tax and business incentives, mainly set up to attract foreign investment and achieve technology transfer. There are different types of special economic zones, ranging in ascending comprehensiveness and area from customs-bonded warehouse, customs-bonded factories, export processing zones, special economic zones to free trade zones. For a detailed classification and description of the various varieties of SEZs, see Wong and Chu (1984).
Despite the varieties of SEZs, they all share certain similar characteristics. Specifically, the main objectives of SEZs are: (1) stimulate economic growth through promotion of exports, (2) attract foreign investment and increase foreign exchange earning, (3) increase employment and (4) achieve a transfer of technology and management skills. In the case of China, the SEZs also function as experiments for piloting the implementation of capitalist policies.

On August 1980, the Chinese government declared four cities in the southeastern coastal region as SEZs, specifically the small cities of Shenzhen, Zhuhai, and Shantou in Guangdong province and Xiamen in Fujian province. In these areas, tax incentives were offered by the local governments to foreign investors. Initially, these were conceptualized to be test-beds for capitalism, in which business enterprises make most of their own investment, production, and marketing decisions, and foreign ownership of such ventures was legalized. The new SEZs were mostly successful in attracting foreign investment and developed rapidly with expanding light and consumer-goods industries and growing populations. The literature generally treats these early SEZs as uniform, but a careful analysis reveals that there are some differences. In fact, Shenzhen and Zhuhai are
comprehensive SEZs while Shantou and Xiamen focused heavily on export processing. In terms of size, Shenzhen is the largest.

**Table 1: The First Four SEZs**

<table>
<thead>
<tr>
<th>City</th>
<th>Shenzhen</th>
<th>Zhuhai</th>
<th>Shantou</th>
<th>Xiamen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (square kilometer)</td>
<td>1948.69</td>
<td>705</td>
<td>8937</td>
<td>1565</td>
</tr>
<tr>
<td>Size of SEZ (square kilometer)</td>
<td>300</td>
<td>7</td>
<td>0.2 (official)</td>
<td>2.5 (1980)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 (actual)</td>
<td>131(1984)</td>
</tr>
<tr>
<td>Type of SEZ</td>
<td>Comprehensive</td>
<td>Comprehensive</td>
<td>Export processing</td>
<td>Export Processing</td>
</tr>
</tbody>
</table>

Encouraged by this early success, 14 larger and older cities along the coastal regions were granted “open coastal city” status and opened to foreign trade and investment in 1984. These coastal opening cities include: Tianjin, Dalian, Qinhuangdao, Qingdao, Yantai, Weihai, Lianyungang, Nantong, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang and Beihai. These cities offered foreign investors similar incentives to the special economic zones but with higher corporate income taxes. In 1983, the entire island province of Hainan was turned into a special area for foreign investment and in 1988 Hainan Island became a separate province and officially became the largest SEZs. Since April 1990 the Pudong New Area in the city of Shanghai became an “open economic zone” with policies even more flexible than those already in force in existing SEZs.

Following the Tiananmen Square incident, Chinese President Deng Xiao-peng visited several SEZs in his famous “trip to the South” in late 1990 and apparently suggested that privileges extended to export-generating firms be not restricted to these zones (Graham, 2004). Subsequently, in 1991, such restrictions were lifted and other measures were taken to further liberalize foreign direct investment. For instance, in 1992, similar policies were implemented in 23 major cities in inland China, including many provincial capitals.

India established the first EPZ in Asia at Kandla (Kutch region) in 1965. The second EPZ appeared in Mumbai in 1974. Four more zones were established in Nodia
(NEPZ), Chennai (Madras Export Processing Zone, MEPZ), Cochin (CEPZ) and Falta (FEPZ) in 1985. In 1994, the EPZ at Vishakhapatnam (VEPZ) was commissioned.

Kundra (2000) notes that stimulating foreign investment was not a key objective for India EPZs, unlike those in the East Asian Miracles and China. Before liberalization in 1991, they were conceived more “as a means of providing relief to the domestic exporters from the regulatory regime.”

Although India has liberalized its trade since 1991, it was only on April 2000 that the Government of India announced the introduction of the Special Economic Zones policy in the country, modeled closely after the Chinese model. The SEZ Act 2005 was formally passed by the Indian parliament on May 2005 and came into effect on 10 February 2006, supported by SEZ rules. Existing EPZs were converted to SEZs and new SEZs were proposed. As of 2007, about 400 SEZs have been proposed, of which 234 have been approved. The number of SEZs is staggering and doubts about the sustainability have been raised.

3. Data and Specification

In this section, we carry out empirical tests of the openness-growth relationship using panel data on the economies of China and India as well as the regional cities of China and India. In the first part, we describe the data tested and in the second part, we present the specifications used in the empirical tests.

3. 1 Data Description

The data set employed in this paper was consolidated from China Statistical Yearbook (various issues), China Data Online and CEIC database. This was cross-validated with data available from the World Development Indicator (World Bank). Data for exports of the Indian EPZ regions are from Kundra (2000) while the national income data are obtained from the Reserve Bank of India.

The years covered for the Chinese national data includes 1952 through 2003. However, the data for the year 1952-1969 was patchy and contains many missing values.
A similar problem occurs with the Indian national data. To balance the panel, the decision was taken to include only observations for the year 1970-2003. This reduced the sample size to 68 sets of observations. A description of the data is as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(GDP)</td>
<td>Log of GDP</td>
</tr>
<tr>
<td>log(Exports)</td>
<td>Log of Exports</td>
</tr>
<tr>
<td>log(FDI)</td>
<td>Log of FDI</td>
</tr>
<tr>
<td>T1</td>
<td>Initial Trade Liberalization Dummy</td>
</tr>
<tr>
<td>T2</td>
<td>Second Trade Liberalization Dummy</td>
</tr>
<tr>
<td>SEZ</td>
<td>Number of SEZs or EPZs</td>
</tr>
</tbody>
</table>

The year coverage for the Chinese regional data is 1978-2001 and the 31 regions are considered. These regions are Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Hainan and Xinjiang. The sample has 704 sets of observations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(GDP)</td>
<td>Log of GDP</td>
</tr>
<tr>
<td>log(Exports)</td>
<td>Log of Exports</td>
</tr>
<tr>
<td>SEZ</td>
<td>SEZ Dummy</td>
</tr>
<tr>
<td>Coastal</td>
<td>Coastal Region Dummy</td>
</tr>
</tbody>
</table>

Unfortunately, complete regional data for India were not available for export level, so our regional analysis for India is restricted to regions with EPZs where the data are available. These include Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal and Gujarat. The period of the sample is from 1980-1997 and the sample has 108 sets of observations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>log(GDP)</td>
<td>Log of GDP</td>
</tr>
<tr>
<td>log(Exports)</td>
<td>Log of Exports Of EPZs in regions</td>
</tr>
<tr>
<td>EPZunits</td>
<td>Number of Operational Units in EPZ</td>
</tr>
</tbody>
</table>
3.2. Specifications

3.2.1 National

The baseline specifications are those of pooled ordinary least square (OLS), which can be used for comparison with the fixed effect and instrumental variables models. In the first specification (1), the log of GDP \((\log Y_{it})\) is regressed on the log of exports \((\log X_{it})\), an initial trade liberalization dummy \((T1)\), a second trade liberalization dummy \((T2)\) as well as the number of SEZs or EPZs for each country in each period \((SEZ_{it})\). The second specification is similar to the first specification, except that the log of foreign direct investment \((\log FDI_{it})\) is included as an additional explanatory variable.

**Pooled Least Square**

(1) \[ \log Y_{it} = \alpha + \beta_1 \log X_{it} + \beta_2 T1_{it} + \beta_3 T2_{it} + \beta_4 SEZ_{it} + \varepsilon_{it} \]

(2) \[ \log Y_{it} = \alpha + \beta_1 \log X_{it} + \beta_2 T1_{it} + \beta_3 T2_{it} + \beta_4 SEZ_{it} + \beta_5 \log FDI_{it} + \varepsilon_{it} \]

where \(T1_{it} = \begin{cases} 0 & \text{before 1st trade liberalization} \\ 1 & \text{after 1st trade liberalization} \end{cases}\)

\(T2_{it} = \begin{cases} 0 & \text{before 2nd trade liberalization} \\ 1 & \text{after 2nd trade liberalization} \end{cases}\)

**Fixed Effect Specification**

Since the national panel comprises observations on a fixed and relatively small set of units of interest (namely, China and India), there is a presumption in favor of fixed effects. Like the pooled OLS, two separate sets of specification (3) and (4) are proposed, one with and the other without the log of foreign direct investment \((\log FDI_{it})\).

(3) \[ \log Y_{it} = \beta_1 \log X_{it} + \beta_2 T1_{it} + \beta_3 T2_{it} + \beta_4 SEZ_{it} + u_{it} \]

(4) \[ \log Y_{it} = \beta_1 \ln X_{it} + \beta_2 T1_{it} + \beta_3 T2_{it} + \beta_4 SEZ_{it} + \beta_5 \log FDI_{it} + u_{it} \]
Instrumental Variable Specification

Our instrumental variable specification for the data set for China and India can be described using a simple two-stage least square panel data model. First, income in country $i$ is a function of exports, FDI and other factors. Specifically, the three models are given by:

$$\log Y_i = \alpha + \beta \log X_i + \varepsilon_i$$  
(5)

$$\log Y_i = \alpha + \beta \log FDI_i + \varepsilon_i$$  
(6)

$$\log Y_i = \alpha + \beta_1 \log X_i + \beta_2 \log FDI_i + \varepsilon_i$$  
(7)

Running an ordinary least-squares (OLS) regression will produce a biased and inconsistent estimator of the parameters if $X_i$ or $FDI_i$ is endogenous and hence we have an identification problem. To resolve this, we need an instrumental variable, which is uncorrelated to $\varepsilon_i$ but correlated to $X_i$ or $FDI_i$. We propose using both the policy dummy variables to denote the shift in policy towards openness and the number of SEZs or EPZs to obtain instrumental estimates of effect of export or FDI on income growth. Because China and India adopted free trade policies in SEZs but did not necessarily liberalize their domestic markets, SEZs as a liberalization policy are unlikely to be correlated with factors omitted from the income equation. Hence they can be used to identify the impact of trade. The equations are as follows:

$$\log X_i = \psi + \phi_1 T1_i + \phi_2 T2_i + \phi_3 SEZ_i + \delta_i$$  
(8)

$$\log FDI_i = \psi^F + \phi_1^F T1_i + \phi_2^F T2_i + \phi_3^F SEZ_i + \delta_i^F$$  
(9)

3.2.2 Chinese Regions

Similarly, for the Chinese regions, the baseline specification is the pooled OLS, which can be described as follows:

$$\log y_i = \alpha + \beta_1 \log x_i + \beta_2 SEZ_i + \beta_3 Coastal_i + \varepsilon_i$$  
(10)

where $y_i$ is income for the region, $x_i$ is export of the region, $SEZ_i$ and $Coastal_i$ are dummy variables for the presence of SEZ or coastal cities in each region for each period while $u_i$ reflects other influences on income of the region.
Both the fixed and random effects panel models are considered for the Chinese regions.

(11) Fixed Effects: \( \log y_{it} = \beta_1 \log x_{it} + \beta_2 SEZ_{it} + \beta_3 Coastal_{it} + u_{it} \)

(12) Random Effects: \( \log y_{it} = \alpha + \beta_1 \log x_{it} + \beta_2 SEZ_{it} + \beta_3 Coastal_{it} + \varepsilon_{it} \)

Running an ordinary least-square (OLS) regression will produce a biased and inconsistent estimator of the parameters because \( x_{it} \) is endogenous and hence we have an identification problem. To resolve this, we need an instrumental variable, which is uncorrelated to \( u_{it} \) but correlated to \( x_{it} \). We propose using the SEZ variable \( (SEZ_{it}) \) and the coastal city dummy variable \( (Coastal_{it}) \) as the instrumental variables. The equation is as follows:

(13) \( \ln x_{it} = \psi + \phi_1 SEZ_{it} + \phi_2 Coastal_{it} + \delta_{it} \)

### 3.2.1 Indian Regions

For the Indian regional dataset, all the regions with complete data have EPZs. In this case, the baseline pooled OLS specification is given by

(14) \( \log y_{it} = \alpha + \beta_1 \log X_{it} + \beta_2 EPZunits_{it} + \varepsilon_{it} \)

where \( y_{it} \) is income for the region, \( x_{it} \) is export of the region \( EPZunits_{it} \) is the number of operational units in each EPZ for each period, while \( u_{it} \) reflects other influences on income of the region.

Like the case of the Chinese regions, both the fixed and random effects panel models are considered:

(15) Fixed Effects: \( \log y_{it} = \beta_1 \log X_{it} + \beta_2 EPZunits_{it} + u_{it} \)

(16) Random Effects: \( \log y_{it} = \alpha + \beta_1 \log X_{it} + \beta_2 EPZunits_{it} + \varepsilon_{it} \)

For completeness, we also consider the instrumental variable model, which is given by using operational units in EPZs to obtain instrumental estimates of effect of export on regional income growth. The equation is as follows:

(17) \( \ln x_{it} = \psi + \phi_1 EPZunits_{it} + \delta_{it} \)
4 Results and Discussion

4.1 National

Table 2 reports the regression for the national panel dataset.

Column (1) presents a pooled OLS regression of log income on log export, openness policy dummy variables and the number of SEZ. The point estimate for exports implies that an increase in export by one percentage point is associated with 0.44 percent in national income. It is interesting to note that the impact of the first liberalization is not significant. The impact of the number of SEZs is statistically significant though it has a point estimate of 0.0044, thus increasing the number of SEZs by one unit has 0.44 percent increase in national income.

Column (2) repeats the same specification as column (1) with the addition of log(FDI) as explanatory variables. FDI is statistically significant though an increase in FDI by one percent point is associated with only a 0.059 percent increase in national income. It is curious to note that with log FDI added, the number of SEZ is no longer significant as an explanatory variable. In this case, it even has a negative sign.

A diagnostic test was performed to determine whether the pooled OLS was adequate. For model (1), the joint significance of differing group means is given by F(1, 62) = 52.2214 with p-value =0.0000, thus rejecting the null hypothesis that the pooled OLS model is adequate, in favor of the fixed effects alternative. Similarly, for model (2), the joint significance of differing group means is F(1, 50) = 51.0613 with p-value 0.0000, which also suggests the fixed effects alternative may be more adequate.

The next two columns, (3) and (4), reports the results of a fixed effects panel data analysis, with and without log FDI as explanatory variables respectively. In both cases, log exports and the number of SEZs are significant while the first liberalization dummy variable is not. In column (3), where log FDI is not included, the second liberalization dummy variable is significant but it is insignificant when the log FDI was included. The point estimates for all the explanatory variables are lower than that for the pooled OLS.

Column (5)-(7) is the IV estimates of the same equation, with exports treated as endogenous and the openness policy variable sand the number of SEZs are used as an instrument. The variable log Exports continued to be significant and from the point
estimates, we also observe that the IV estimate of trade’s impact on income is higher than the OLS estimates. One possible reason is that although these countries liberalized their trade policies through SEZs, they did not adopt other growth-enhancing policies. This will lead to a negative correlation between exports and the errors terms in an OLS regression and thus to downward bias in the OLS estimate of export’s effects.

Table 2.1: Hausman Test

<table>
<thead>
<tr>
<th></th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptotic Test Statistics</td>
<td>6.052</td>
<td>28.4845</td>
<td>1.93139</td>
</tr>
<tr>
<td>p-value</td>
<td>0.0139</td>
<td>0.0000</td>
<td>0.380718</td>
</tr>
</tbody>
</table>

For model (5) to (7), a Hausman test is performed on the null hypothesis that the OLS estimates are consistent. The asymptotic test statistics and the corresponding p-values are reported in the table above. From the table, the null hypothesis is rejected for both model (5) and (6) at 5% significance level but could not be rejected for model (7).

Table 2.2: Sargan Test

<table>
<thead>
<tr>
<th></th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Statistics</td>
<td>5.7180</td>
<td>3.1551</td>
<td>2.8203</td>
</tr>
<tr>
<td>p-value</td>
<td>0.0573</td>
<td>0.2065</td>
<td>0.0931</td>
</tr>
</tbody>
</table>

Additionally, a Sargan over-identification test on the null hypothesis that all instruments are valid. The chi-square test statistics and the corresponding p-values are reported in the table above. From the table, there is no evidence to reject the null hypothesis that all the instruments are valid for all the three models at 5% significance.

Table 2.3: First-stage F-statistics

<table>
<thead>
<tr>
<th></th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-stage F-statistics</td>
<td>F-statistics(3.64)= 124.612</td>
<td>F-statistic (3,53) = 179.897</td>
<td>F-statistic (2, 54) = 227.869</td>
</tr>
</tbody>
</table>

Finally, the first-stage F-statistics reported are all more than 10, suggesting that the instruments are not weak in all models.
Table 2: Openness and Growth (National)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pooled OLS (1)</th>
<th>Fixed Effects (2)</th>
<th>Fixed Effects (3)</th>
<th>Fixed Effects (4)</th>
<th>Instrumental Variables (5)</th>
<th>Instrumental Variables (6)</th>
<th>Instrumental Variables (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>15.5888***</td>
<td>15.4592***</td>
<td>13.5147***</td>
<td>26.9099***</td>
<td>8.4442***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.9472)</td>
<td>(0.9607)</td>
<td>(0.3068)</td>
<td>(0.0507)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(Exports)</td>
<td>0.4444***</td>
<td>0.4613***</td>
<td>0.3933***</td>
<td>0.4099***</td>
<td>0.5350***</td>
<td></td>
<td>0.7376***</td>
</tr>
<tr>
<td></td>
<td>(0.0413)</td>
<td>(0.0413)</td>
<td>(0.0377)</td>
<td>(0.0585)</td>
<td>(0.0124)</td>
<td></td>
<td>(0.1277)</td>
</tr>
<tr>
<td>T1</td>
<td>0.0190</td>
<td>-0.1515</td>
<td>0.0850</td>
<td>0.0559</td>
<td>Instrument</td>
<td>Instrument</td>
<td>Instrument</td>
</tr>
<tr>
<td></td>
<td>(0.0681)</td>
<td>(0.0944)</td>
<td>(0.1153)</td>
<td>(0.0755)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>0.1242**</td>
<td>0.0930*</td>
<td>0.0966***</td>
<td>0.0074</td>
<td>Instrument</td>
<td>Instrument</td>
<td>Instrument</td>
</tr>
<tr>
<td></td>
<td>(0.0496)</td>
<td>(0.0464)</td>
<td>(0.0236)</td>
<td>(0.0416)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEZ</td>
<td>0.0044**</td>
<td>-0.0004</td>
<td>0.0114***</td>
<td>0.0122***</td>
<td>Instrument</td>
<td>Instrument</td>
<td>Instrument</td>
</tr>
<tr>
<td></td>
<td>(0.0020)</td>
<td>(0.0021)</td>
<td>(0.0005)</td>
<td>(0.0021)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>log(FDI)</td>
<td>0.059**</td>
<td>0.0369***</td>
<td>0.3488***</td>
<td>-0.1426</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.028)</td>
<td>(0.0028)</td>
<td>(0.0281)</td>
<td>(0.0948)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>68</td>
<td>57</td>
<td>68</td>
<td>57</td>
<td>68</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.9633</td>
<td>0.9675</td>
<td>0.9797</td>
<td>0.9820</td>
<td>0.9579</td>
<td>0.7645</td>
<td>0.8901</td>
</tr>
<tr>
<td>SE of Regression</td>
<td>0.1390</td>
<td>0.1296</td>
<td>0.1033</td>
<td>0.0921</td>
<td>0.1498</td>
<td>0.3420</td>
<td>0.2434</td>
</tr>
</tbody>
</table>

Notes
1. Numbers in parentheses are robust (White-heteroskedasticity corrected) standard errors.
2. ***, ** and * indicates the coefficient if significantly different from zero at the 1%, 5% and 10% levels, respectively.
4.2 Chinese Regions

Table 3 reports the regressions for the panel data for the Chinese regions. Column (1) presents the baseline pooled OLS regression of log income on log export and openness policy variables. The point estimate for exports implies that an increase in export by one percentage point is associated with 0.65 percent in regional income. It is interesting to note that the signs for both the SEZ and the Coastal variable are negative and that the SEZ variable is statistically significant. Again, the wrong sign possibly indicate that the pooled OLS may not be an adequate specification. The joint significance of differing group means is $F(30, 670) = 20.6428$ with a low p-value, thus rejecting the null hypothesis that the pooled OLS model is adequate and favor the fixed effects alternative. Similarly, the Breusch-Pagan test statistic LM is given by $641.615$ with a low p-value, thus suggesting that a random effects alternative may be more adequate than the pooled OLS.

Column (2) and (3) reports the fixed and random effects model respectively. The regression indicates a statistically significant relationship between export and income. The point estimate implies that an increase in export by one percentage point is associated with 0.76 percent in regional income for the fixed effects model and 0.74 percent for the random effects, which are both higher than the pooled OLS. The coastal variable is significant for both, although the SEZ variable is only significant for the fixed effects model. Performing a Hausman test on which specification is preferred, the test statistic is $112.645$ with p-value $= \text{prob}(\text{chi-square}(3) > 112.645) = 2.95843\text{e-024}$. The low p-value counts against the null hypothesis that the random effects model is consistent, in favor of the fixed effects model.

Column (4) is the IV estimates of the same equation, with exports treated as endogenous and the SEZ and coastal variables are used as an instrument. The coefficient on export falls to 0.51. The IV estimate implies that a one-percentage-point increase in the export raises regional income by 0.51 percent, lower than that for the pooled OLS, fixed effects or random effects models. One possible reason is that these liberalized regions are likely to adopt other growth-enhancing policies, hence resulting in a positive correlation between exports and the errors terms in an OLS regression which biases the OLS estimate of export’s effects upwards.
The asymptotic test statistic for the Hausman test is 14.6454 with p-value=0.0001, which rejects the null hypothesis that the OLS estimates are consistent. The first-stage F-statistic (2, 701) is given by 215.872, which indicates that the instruments are not weak.
Table 3: Openness and Growth (Chinese Regions)

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) Pooled OLS</th>
<th>(2) Fixed Effects</th>
<th>(3) Random Effects</th>
<th>(4) Instrumental Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>4.48362***</td>
<td></td>
<td>3.68841***</td>
<td>5.31743***</td>
</tr>
<tr>
<td>log(Exports)</td>
<td>0.650296***</td>
<td>0.764336***</td>
<td>0.739940***</td>
<td>0.514143***</td>
</tr>
<tr>
<td>SEZ</td>
<td>-0.608013***</td>
<td>0.737966***</td>
<td>0.189197</td>
<td></td>
</tr>
<tr>
<td>Coastal</td>
<td>-0.0556094</td>
<td>0.986394***</td>
<td>0.774956***</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>704</td>
<td>704</td>
<td>704</td>
<td>704</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.6972</td>
<td>0.835599</td>
<td></td>
<td>0.682419</td>
</tr>
<tr>
<td>SE of Regression</td>
<td>0.742896</td>
<td>0.547398</td>
<td>0.867436</td>
<td>0.782441</td>
</tr>
</tbody>
</table>

Notes
1. Numbers in parentheses are robust (White-heteroskedasticity corrected) standard errors.
2. ***, ** and * indicates the coefficient if significantly different from zero at the 1%, 5% and 10% levels, respectively.
### Table 4: Openness and Growth (Indian Regions)

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) Pooled OLS</th>
<th>(2) Fixed Effects</th>
<th>(3) Random Effects</th>
<th>(4) Instrumental Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>8.9431***</td>
<td>8.96697***</td>
<td>8.84118***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.1083)</td>
<td>(0.263289)</td>
<td>(0.117169)</td>
<td></td>
</tr>
<tr>
<td>log(Exports)</td>
<td>0.0721**</td>
<td>0.0588***</td>
<td>0.0588843***</td>
<td>0.111670***</td>
</tr>
<tr>
<td></td>
<td>(0.0288)</td>
<td>(0.0179)</td>
<td>(0.000800799)</td>
<td>(0.0195092)</td>
</tr>
<tr>
<td>EPZunits</td>
<td>0.0021</td>
<td>0.0031</td>
<td>0.00304653***</td>
<td>Instrument</td>
</tr>
<tr>
<td></td>
<td>(0.0019)</td>
<td>(0.0021)</td>
<td>(0.00974452)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>108</td>
<td>108</td>
<td>108</td>
<td>108</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.2817</td>
<td>0.920736</td>
<td></td>
<td>0.279</td>
</tr>
<tr>
<td>SE of Regression</td>
<td>0.5004</td>
<td>0.1662</td>
<td>0.4986</td>
<td>0.5027</td>
</tr>
</tbody>
</table>

**Notes**
1. Numbers in parentheses are robust (White-heteroskedasticity corrected) standard errors.
2. ***, ** and * indicates the coefficient if significantly different from zero at the 1%, 5% and 10% levels, respectively.
4.3 Indian Regions

Table 4 reports the regressions for the panel data for the Indian regions, for the period 19801-997. Since data on exports are available only for regions with EPZs, the results are only indicative but still offer some interesting insights.

Column (1) presents the baseline pooled OLS regression of log income on log export and the number of operational units in each EPZ. The point estimate for exports implies that an increase in export by one percentage point is associated with a mere 0.0721 percent in regional income. The number of units in each EPZ is not statistically significant.

The joint significance of differing group means is \( F(5, 100) = 170.296 \) with a low p-value, thus rejecting the null hypothesis that the pooled OLS model is adequate and favor the fixed effects alternative. Similarly, the Breusch-Pagan test statistic LM is given by 721.745 with p-value = 5.58663e-159, thus suggesting that a random effects alternative may be more adequate than the pooled OLS.

Column (2) and (3) reports the fixed and random effects model respectively. The regression indicates a statistically significant relationship between export and income. The point estimate implies that an increase in export by one percentage point is associated with 0.059 percent in regional income for both the fixed effects model and the random effects, which is lower than the pooled OLS. The number of units in each EPZ is not statistically significant for the fixed effects but is significant for the random effects. Performing a Hausman test on which specification is preferred, the test statistic is \( H = 0.00242529 \) with p-value = 0.998788. The high p-value implies that one cannot reject the null hypothesis that the random effects model is consistent, thus favoring the random effects model.

Column (4) is the IV estimates of the same equation, with exports treated as endogenous and the number of operational units in EPZ is used as an instrument. The coefficient on export increases to 0.11. The IV estimate implies that a one-percentage-point increase in the export raises regional income by 0.11 percent, higher than that for the pooled OLS, fixed effects or random effects models. A Hausman test was performed, with the asymptotic test statistic given by 1.44344. The high p-value = 0.229584 suggests that it is not possible to reject the null hypothesis that the OLS estimates are consistent.
5 Policy Implications

In this section, we discuss the policy implications of the results. Firstly, we consider whether SEZs have a multiplier or immiserizing impact on economic growth. Next, we question whether increasing the number of SEZs will have substantial effect on growth rate.

5.1 “Multiplier” and Immiserizing Effects

Do exports promotion through the development of EPZs and SEZs have a multiplier impact on growth, as claimed by institutions like the World Bank and WTO, or do they have an immiserizing effect, as concluded by Hamada (1974)? This is a question that we can attempt to resolve using our empirical results.

Based on our estimated regression, we can calculate both the export growth rate and economic growth rate and their relationship.

We start with the national level. Using the coefficients for model (5) in table 2,

\[
\log Y = 13.5147 + 0.5350 \log X
\]

Differentiating (6) throughout with respect to \( t \), we obtain

\[
\frac{\dot{Y}}{Y} = 0.5350 \frac{\dot{X}}{X}
\]

Hence, at the national level, a 1 percentage point increase in export growth rate only increases economic growth rate by 0.5350 percent. Alternatively, we can say that economic growth in these countries is not export-elastic.

To determine the elasticity of economic growth with respect to FDI, a similar approach can be adopted. Using the coefficients from model (6) of table 2, it can be shown that a 1 percentage point increase in export growth rate only increases economic growth rate by 0.3488 percent, which is even less than that for exports.
Thus, at the national level, there does not seem to be any multiplier effect of exports on economic growth. On the other hand, there appears to be an indication of immiserizing effect in model (7) of table 2, the sign of log(FDI) being negative. However, the point estimate is not statistically significant.

Likewise, we can check for the multiplier effects for the Chinese region, which is as follows. From model (4) in Table 3, \( \log y_{it} = 5.3174 + 0.5141 \log x_{it} \), so it follows that

\[
\frac{\dot{y}}{y} = 0.5141 \frac{\dot{x}}{x}
\]

At the Chinese regional level, a 1 percentage point increase in export growth rate only increases regional growth rate by 0.5141 percent. So while the presence of SEZs may exert positive effect on the growth rate, the increase in regional growth is even more export inelastic than at the national level.

Finally, for the Indian regions with EPZs, we use the random effects model (3) from Table 4 to obtain

\[
\frac{\dot{y}}{y} = 0.0589 \frac{\dot{x}}{x}
\]

This indicates that a 1 percentage point increase in export growth rate in Indian regions with EPZs only increases regional growth rate by a mere 0.0589 percent. As in the case of the Chinese regions, the increase in regional growth is even more export inelastic than at the national level.

5.2 Number of SEZs and Economic Growth Rate

Since 2000, India has embarked on increasing the number of SEZs. As of 2007, about 400 SEZs have been proposed, of which 234 have been approved. Will the staggering increase in number of SEZs have a significant impact on economic growth? From our empirical results, such a strategy may not be wise. Using the fixed effect model (3) from Table 2, the effect of increasing the number of SEZ on national growth is not substantial.

\[
\log Y = 0.3933 \ln X + 0.0850 * T1 + 0.0966 * T2 + 0.0114 * SEZ
\]
From (12), it is obvious that $\Delta \ln Y = 0.0114\Delta SEZ$, hence increasing the number of SEZ by 200 will only increase the national income by 2.28 or 0.0228%, not a very remarkable increase.

For the Indian regions, the increase in number of EPZ units does not alter the regional income significantly. From equation (10),

$$\Delta \ln y_u = 0.0030\Delta \text{EPZunits}$$

Therefore, increasing the number of EPZ units by 200 will only increase the national income by 0.006%, again not very substantial.

6. Conclusion

In this paper, we investigate the impact of opening up the China and Indian economy on economic growth in these countries. We based our empirical analysis on new panel data sets for both the national economies and the regional economies of China and India.

Instead of using export to GDP ratio as a measure of openness, we use policy dummy variables to denote the shift in policy towards openness and also take into account the presence of SEZs in our specification. By doing so, we seek to understand SEZ as both liberalization and growth policies.

At the national level, export is statistically significant in all the specifications. However, the instrumental variable estimate of trade’s impact on income is higher than the OLS estimates. Thus, it is possible that although these countries liberalized their trade policies through SEZs, they did not adopt other growth-enhancing policies. This will lead to a negative correlation between exports and the errors terms in an OLS regression and thus to downward bias in the OLS estimate of export’s effects.

Of the two phases of liberalization in both countries, the second stage is statistically significant for most specification. One possible reason is that the scale of liberalization is greater in the second phase. Additionally, we demonstrate that increasing the number of SEZs has very negligible effect on economic growth. Taken together, these results suggest that what contributes to greater growth is a greater scale of liberalization, rather than increasing the number of SEZs. The policy implication is that India may need
to consider its large scale creation of SEZs in favor of a greater liberalization of the economy.

Consistent with popular perception and existing studies, export growth does have a positive and statistically significant effect on economic growth in these countries. However, contrary to these perceptions, export growth does not have a “multiplier” effect on economic growth: the growth rates of these countries are export inelastic, in the sense that a one percentage point increase in export growth rate will have a less than one percentage point increase in economic growth rate of these countries. Based on our data, the percentage increase in national economic growth rate was 0.54. In the IV model, there also appears to be an indication of immiserizing effect of FDI, as suggested by Hamada (1974). However, the point estimate is not statistically significant. In other specifications, FDI appears to have statistically significant and positive impact on economic growth though the FDI elasticity of economic growth is lower than export elasticity.

Our analysis also delves deeper into the relationship at the regional level for both China and India. In the case of China, we concludes that while the presence of SEZs may exert positive effect on the regional growth rate, the increase in regional growth is even more export inelastic than at the national level. In this case, our estimate of the percentage increase in regional economic growth was 0.51 for every 1 percentage increase in regional exports. For India, the lack of complete data restricts the data set to only those regions with EPZs. In these regions, economic growth is very export inelastic as an increase in export by one percentage point leads to a mere 0.0721 percent in regional income. The number of operational units in each EPZ is not statistically significant in all specifications, except the random effects model. Even then, the increase in number of operational units in each EPZ has very limited impact on regional growth.

There are two important caveats to these conclusions. Both countries are large countries and have more opportunity to trade between the regions. Hence, our results may not apply to smaller economies like Hong Kong or Singapore. We have also not accounted for the impact of these regional trades on national income. It is possible that increased trade between regions within a country can also have effect on capital accumulation and hence income. In this respect, we are restricted by the current lack of
available and reliable data for regional trade. We leave these extensions as potential areas for future research.

Nevertheless, our study dispels the popular view that adopting a policy of more openness through SEZs in the economy has a “multiplier” effect on economic growth. This should provide some food of thought for countries pondering open-growth policy prescriptions from the World Bank study and contributes to the understanding of the openness-growth nexus.
Reference

China Statistical Yearbook (various issues)