

Do City Brandings Promote Urban Development? A Quasi-natural Experimental Study Represented by the Hostings of the World Expo and the Asian Games

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Abstract

For decades, the effect of **worldwide reputation on economic growth** has been neglected. Based on the natural experiment of **hosting global events**, this paper employs **the synthetic control method** to study the economic value of cities' worldwide reputation in China. The results show that the hosting global events based on exploring worldwide reputation brings significant **economic effect**. On average, the cities' **nighttime light intensity** increased by 2.75% per year after the city-renaming reform. More importantly, we find that those effects are mainly realized through **tourism industry development, urban infrastructure development and light industrial products in domestic sales expansion**. Therefore, the strategy of hosting global events is crucial, for only the hosting based on worldwide acknowledgement can bring economic value. Moreover, the **soft power** of city brand and culture should be paid attention to while designing development plans of cities.

Keywords: City Brand, SCM, the World Expo, The Asian Games, the Netflix Economy

1. Introduction

The modern society viewed the city brand a unique asset that cannot be ignored. Asker and Yeung(1992) proposed that the brand value of a firm has a critic impact on firm performance through channels as people's perception of the brand, perceived quality and associations. Similarly, the brand value of a city can also significantly influence the development of the city. Historically, many famous cities have been destroyed in wars, but have since grown and prospered, with the brand value of the city itself undoubtedly playing an important role; and realistically, city brands have a tremendous impact on the competitiveness of cities. For example, the branding of Suzhou and Hangzhou as "Heaven above, Su and Hang on the ground" has greatly enhanced their attractiveness.

Moreover, local governments also attach great significance to the relevance of brand value to city development and have taken a series of initiatives to enhance the brand value of their cities and strengthen their competitiveness. For example, numerous cities have placed city promotional videos on CCTV to publicise the characteristics of the city, build the city's image and enhance its visibility and brand value. Another vivid example is the recent prosperity of Zibo Barbecue has increased the popularity of Zibo to a large extent, which in turn has boosted the economy and turned it from a frontier town into one of the country's most famous online cities.

The economic value of a country or city's image has been explored in several research literatures. The country-level research literature has found that a good national image or positive word of mouth will contribute to a significant increase in overall trade flows in the country (Chang and Fujii, 2012). And similarly at the city level, Keller (2003) has found that 'a city can be branded', while Gallarza et al. (2002), Chen and Tsai (2007) and Zhan et al. (2014) proposed that city image can directly influence consumer decisions, especially in the tourism sector. The above macro-level research findings are also validated by micro-level evidence. City image affects consumer behaviour and brand awareness (McCallum et al., 2005); while reputation image can be influenced through purchase intention (Klein et al., 1998), quality assessment (Verlegh and Steenkamp, 1999; Josiassen et al., 2008) and willingness to pay (Huan and Wang 2010; Koschate-Fischer et al., 2012).

However, in contrast to the high level of attention at the practice level and the proved significance of brand to cities, academic research on city brand value is relatively scarce. On the one hand, studies on brand value have mainly focused on the firm level (Yeung and Ramasamy, 2008; Qiao Jun and Peng Jisheng, 2013). While on the other hand, the existing literature on urban soft environments has little focus on the impact of city branding effects, and even less research has analysed the impact of city brand value on cities. Liu, K. (2018), Lu, M. et al. (2018) have mainly focused on cultural and institutional environments; Pendakur and Pendakur (2002); Alesina and La Ferrara (2005); Gao and Long (2014); Chen Binkai and Chen Siyu (2018); Ding Congming et al. (2018) studies cultural diversity, clan culture and other cultural factors. Acemoglu and Johnson (2005); Falvey et al. (2006); Fang Ying and Zhao Yang (2011); Dong et al. (2012) finds that institutional factors such as property rights protection and business environment can have an impact on urban development. The reasons for this might be: firstly, most studies on cities focus on the production function of cities (Combes et al., 2011; Behrens et al., 2014) and relatively few studies on the living function of cities (Glaeser et al., 2001), while the cultural function of cities has attracted even less attention from economists. Secondly, the value of city brands is difficult to quantify and not easy to get a reasonable measure, which also makes research very difficult.

Until now, there has been no academic research to quantify the impact of this policy. Relevant literature adapt traditional regression methods such as Dividend in Dividend, Instrumental Variables and representative economical model building. The two main obstacles are: firstly, the shortcomings of the assessment methodology. In traditional policy evaluation, the DID method, which is the most commonly used method, requires that the treatment and control groups are comparable before the event. However due to the specificity of the pilot cities, which are mostly first and second tier cities, the traditional method is not applicable here. Secondly, the interference of a variety of factors. Alongside the event, the city has adopted a variety of other policies to enhance the image of the city, such as the creation of a civilised city, self-promotion, etc. The effects of these policies are mixed with the event and it is difficult to disentangle them. When it comes to the research methods, many literature adapt traditional regression methods such as Dividend in Dividend, Instrumental Variables appliance and representative economical model building.

To fill in the research gap and further explore on the economic effects of city branding, this study uses

city night-time lighting data from 2006-2016 and assesses the economic value of historical city cards using the SCM (Synthetic Control Method). Our findings show that the hosting of globally renowned events generates a significant city card effect for cities. Specifically, the total intensity of nighttime lighting following the hosting of major events increased by an average of 3.10 per cent per year. Further analysis of the impact channels revealed that hosting world events boosted the tertiary sector, increased the city's industrial output and expanded domestic sales of light industrial products by local firms, mainly in the form of increased product sales volume (rather than price premiums).

The contributions of this paper relative to the existing literature are mainly in three areas: Initially, we assess for the first time the impact of hosting world events on the branding of Chinese cities and thus on their economic development, expanding the field of research on the economic impact of informal institutions and filling a gap in the existing literature. The current research literature examines the economic impact of urban soft power in terms of cultural and institutional environments, focusing on cultural factors such as cultural diversity and clan culture, as well as property rights protection and the business environment, ignoring the crucial impact of city branding on economic development in a large developing country represented by China with a long history and culture and a prevalent netroots economy. Additionally, we have adopted a purely data-driven synthetic control assessment idea that deals with the non-random nature of target city selection in reform experiments. Generally speaking cities with the existence of a certain level of world recognition are more likely to have the 'gimmick' of hosting a worldwide event, which in itself is a reflection of the heterogeneity of the city. Thus the selection of cities to host events may be non-random in nature, or may defy the assumption of parallel trends if heterogeneity is strong enough. Both of these problems lead to the fact that conventional policy analysis techniques such as DID and propensity score matching are no longer suitable for assessing the economic effects of hosting global events in cities on a macro level. Ultimately, the use of GDP as a measure of economic development suffers from measurement bias, in the form of overestimation bias and non-comparability between regions. Based on the above considerations. We use nighttime light imagery from the Operational Line Scan Sensor (DMSP/OLS) on board the US Defence Meteorological Satellite (DMS) to measure the level of urban development.

The rest of this paper is organized as follows. Section 2 introduces the Policy background, Section 3 displays the study design and data. Section 4 and 5 performs key regression results and analysis of impact mechanisms, Section 6 discusses conclusions and policy tests.

2. Policy background

2.1. Events' Introduction

2.1.1. The World Exposition

The World Exposition, or Expo for short, is an international mega-event registered or recognised by the Bureau of International Exhibitions (BIE) and hosted by a sovereign government with the participation of several governments and international organisations, similar to the Olympic Games and the World Cup. In the field of events and event tourism research, it is a major event, an international event

with a large impact and a long history, organised by the host government or the government delegated to the relevant departments, and is known as the world's economic, cultural and scientific Olympic event.

The World's Fair originated in the regular fairs between European merchants in the Middle Ages. The English and French word "pavilion" became the official name for the "exposition pavilion", and in 1851 the British Universal Exhibition was the first real exposition, lasting 164 days, with 10 countries participating and 6.3 million visitors. It completed the metamorphosis from an early fair to a modern exposition, defining three key elements of a modern exposition: firstly, it was a sovereign state that organised it, and it was a window for the state to showcase its economic development. The first is that it is organised by the sovereign state and is a window for the state to showcase its level of economic development. Secondly, the participation of sovereign states became a platform for exchanges and displays between countries. Thirdly, it was transformed from a trade fair into an all-round exhibition and exchange.

With World Expos being held all over the world, they are now the highest level of exhibition in the world. It has finally gained worldwide recognition for its enormous contribution to technology, trade and cultural exchange, and its charm and influence have endured. Unlike other exhibitions and conventions, the Expo, hosted by a sovereign government, represents the international image of a country and is an important symbol of a country's rise to global recognition; it is a global event that showcases the political, economic, social, cultural, scientific and technological achievements and development prospects of the host country and the participating countries in all aspects. It can be compared to "the Olympic Games in the economic, cultural, scientific and technological fields" and an "accelerator" for economic and social development.

The theme of the Shanghai Expo is "Better City, Better Life". The duration of the Shanghai Expo is 6 months opening on May 1, 2010 and closing on November 31, 2010, a total of 182 days. The Shanghai Expo is a major urban event. As the leaders of the Shanghai Municipal Party Committee pointed out "The successful acquisition of the right to host the World Expo in the year is another major historical opportunity for Shanghai after the development of Pudong in the last century."

2.1.2. The Asian Games

The Asian Games, are the largest comprehensive games in Asia and are hosted by the member countries of the Olympic Council of Asia on a rotating basis every four years.

Located at the forefront of China's reform and opening up, Guangzhou is the political and economic centre of the Lingnan region and an important window for China's foreign exchanges. The long-standing exchange and fusion of Chinese and Western cultures has led to the development of a pluralistic character in Guangzhou, resulting in an inclusive, open, pragmatic and enterprising city culture. As Guangzhou is known as the "City of Sheep", the mascot for the Guangzhou Asian Games is the cartoon sheep. The Asian Games mascot, the Guangzhou Five Sheep sculpture and the kapok are featured on the Guangzhou Asian Games tickets, displaying the strong Lingnan atmosphere and highlighting the city's identity.

During the preparations for the Asian Games, Guangzhou attached great importance to the spread of sportsmanship and sports culture, calling on the entire city to participate in the construction of the

Games and in sports. According to statistics, "In 2009, Guangzhou's sports work was very fruitful - mass sports created a strong social sports atmosphere in the Asian Games city; 10 city-wide, 100 district (county-level city) level and 1,000 national fitness popularisation activities were organised, reaching out to streets, towns, communities, neighbourhood committees and village committees. More than 2,500 sports activities were organised at the city, district and street (town) levels, involving 10.2 million people." The enthusiasm of the masses to participate in sports is high, and sports have created a strong social atmosphere in the Asian Games city. The city has a strong social atmosphere.

2.2. Hosting Global Events' Economical Effect

2.2.1. Potential Economical Revenue

City events are a natural strategic choice for many cities seeking to pursue an international development path as major events hosted by the city and attended by a wide international audience. City events have a wide reach and relatively constant appeal over a number of years, while the process of hosting a city event provides a visual representation of government control and is accompanied by an intensive mix of high profile events and exchanges that build confidence in the entry of talent and capital.

In the process of adjusting to a cosmopolitan city, each city must learn and master the 'rules of the game' of international cooperation and competition in order to stand out among its peers and move towards the goal of becoming an international metropolis. Cooperation relies on exchange and communication, while competition requires strength as a basis. The World Expo and the Asian Games are places where the world's diverse cultures and technologies meet and are showcased. They have become internationally recognised as the best platform for exchange and communication, and the best stage for demonstrating economic, technological and cultural strength. Major city events are essential for entering the world city network, and hosting major international events is a simple and efficient way to gain international recognition of a city's international status. The hosting of the World Expo or the Asian Games, both of which have a huge international impact, is a once-in-a-lifetime opportunity for Shanghai and Guangzhou to integrate into the world city system.

The rise of the tertiary sector and the increase in the visibility of the city is a necessary condition for the city to become an 'investment magnet'. In order to ensure the smooth running of a city event, the host city must invest a great deal of resources in the functional improvement of infrastructure and the construction of a soft environment for services. The effect of a major city event on the city's intrinsic functions is mainly reflected in the following five aspects:

- 1). It promotes modernisation. infrastructure, convenient and speedy transport systems within and outside the city and high-capacity networked communication systems to ensure its synchronised response with the world.
- 2). It enhances the city's radiation and agglomeration capacity. In order to establish an international trade centre for products, capital, technology and information, and a comprehensive talent pool, the city will be able to offer a wide range of services and services. The city's ability to create conditions for the establishment of an international trade centre for products, capital, technology and information, and a comprehensive talent hub.

- 3). It improves the city's comprehensive service functions. The city's comprehensive service functions will be improved and the headquarters of multinational companies and international organisations will be upgraded. The soft environment for international economic entities of all kinds to locate in the city.
- 4). It optimises a fair, just and open market economy, a reciprocal and reasonable degree of openness to the outside world, and an honest, trustworthy, efficient and pragmatic government.
- 5). It provides good social security, a humanistic base and an ecological environment with a rich and varied urban material and cultural life.

The initial investment in preparing for a major urban event can be recognised by all parties through the external effects of the urban event, while the hardware and software facilities can continue to serve the city and the general public afterwards.

2.2.2. Potential Social Cost

However, organising a world event can also be a risky venture and have a negative impact on urban development. Firstly, hosting a major event can increase the cost of social management, which is highlighted by various governmental administrative expenses. For example, the construction of venues, publicity costs and the costs of hosting foreign guests. Secondly, hosting a world event may cause inconvenience to residents and constitute a series of hidden social costs, such as traffic congestion caused by the closure of the area around the venue and the pressure on the normal life of the city caused by the influx of people from various regions. This will all add significantly to the cost of administration and social management, at least in the short term, resulting in a waste of social resources. Thirdly, because of the large sunk costs, when the event is cancelled or postponed due to force majeure (as in the case of the Hangzhou Asian Games), it can cause greater pressure on the city: short-term economic recession, negative public sentiment, etc.

3. Study Design and Data

3.1. Synthetic Control Method

The key to scientifically assessing the impact of hosting a world event on the economic development of a city is to find a suitable method for evaluating the effects of the policy. The Double Difference-in-Difference Method (DID) has been popular among scholars in China and abroad. However, this method requires that the intervention and reference groups are comparable prior to the intervention, a requirement that is difficult to meet due to regional heterogeneity, and therefore prone to bias in the evaluation of policy effects. To overcome the shortcomings of the DID method, Abadie and Gardeazabal (2003) proposed a new method for identifying policy effects - the Synthetic Control Methods (SCM). This method allows the construction of a 'counterfactual' reference group for each individual policy intervention, i.e. a synthetic control object, by weighting the reference group to simulate the urban development of Shanghai and Guangzhou in the absence of a world event, in order to compare the effects of the implementation of the policy. This is comparable to a quasi-experimental study in which the same

region is compared at the same point in time during the study period, and the results of the comparison between the urban development of the region with and without the event are the effects of the event.

In this section we base our quantitative assessment of the economic effects of hosting a worldwide event on the purely data-driven synthetic control analysis technique. Assuming the existence of $J + 1$ regions, it is assumed without loss of generality that the 1st region is affected by hosting the event, while the other J regions are a potential control group.

Y_{it}^N is the i th region's economical indicator in year t when it dose not hold any events. T_0 is the number of periods before intervention, and there is $1 \leq T_0 \leq T$. Y_{it}^I is the i th region's economical indicator in year t when it's influenced by having hold worldwide events, where $t \in (T_0, T)$. Then the real economical outcome Y_{it} of the i th region viewed in year t can be written as:

$$Y_{it} = Y_{it}^N + \alpha_{it}D_{it}, \text{ where } D_{it} = \begin{cases} 1 & \text{when } i = 1 \text{ and } t > T_0 \\ 0 & \text{else.} \end{cases}$$

And in the $t > T_0$ period after intervention, the policy effect of the influenced region 1 is:

$$\alpha_{it} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N,$$

where Y_{1t} is the actual observable economic indicator status, in order to estimate the policy effect α_{it} , it is necessary to construct a counterfactual outcome Y_{it}^N for the target of the intervention in the absence of the urban renaming policy. Abadie et al. (2010) show that there is an optimal set of weight combinations. It has good good historical properties, i.e., it satisfies the following conditions:

$$\begin{aligned} \sum_{j=2}^{J+1} \omega_j^* Y_{j1} &= Y_{11}, \sum_{j=2}^{J+1} \omega_j^* Y_{j2} = Y_{12}, \dots, \\ \sum_{j=2}^{J+1} \omega_j^* Y_{jT_0} &= Y_{1T_0}, \text{ and } \sum_{j=2}^{J+1} \omega_j^* Z_j = Z_1. \end{aligned}$$

Now for $t \in (T_0, T)$, we can apply $\sum_{j=2}^{J+1} \omega_j^* Y_{jt}$ as an unbiased estimate of Y_{it}^N to approximate Y_{it}^N , and policy effect can be written as:

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} \omega_j^* Y_{jt}, \quad t \in \{T_0 + 1, \dots, T\}$$

Based on the above idea, we can achieve the calculation of the optimal weight combination by solving for the minimisation of $X_1 - X_0W$ and satisfying the constraint on $\omega_j^* \geq 0$ and $\omega_2^* + \dots + \omega_{J+1}^* = 1$ at $j = 2, \dots, J + 1$. where X_1 is the pre-reform feature vector of the renamed city and X_0 is the pre-reform feature vector of the control group of cities.

The synthetic control method (SCM) provides a more objective and accurate estimate of the effect of property tax policies on industrial shifts than the double difference (DID) and propensity score matching (PSM) methods, which are subjective and arbitrary in their choice of reference group and unconvincing. The systematic differences between the treatment and reference groups may be the reason for the property tax in the control group, there would be no good reason to be able to exclude the endogeneity of the

policy, and a biased result would be obtained if the DID is directly used for estimation. The propensity score matching method, on the other hand, is based on the assumption of conditional independence to create a reference group to simulate a randomised trial to analyse the impact of the policy. Although both propensity score matching and synthetic control methods use information from the reference group to construct an artificial control group, propensity score matching uses panel data as a mixture of individual formation, which does not allow for individual-specific analysis, and the intersection of individuals and years will lead to biased results (Suji and Hudi, 2015). The synthetic control method can well overcome the shortcomings of the above two methods by weighting multiple reference group objects to construct a reference object that is exactly similar to the treatment group.

The advantages of SCM are: firstly, it is based entirely on data-driven construction of counterfactual control groups, which better solves the non-random challenge of experimental group selection in traditional policy assessment; secondly, the synthetic control assessment technique uses a combination of multiple units as the control group, while allowing access to detailed information about the process, such as the relative contribution of each control unit to the counterfactual of interest, the difference between the actual trend of the policy-influenced unit actual trends compared to differences in synthetic counterfactual trends, etc.; thirdly, as the contribution weights are strictly constrained to be positive while summing to one, it also ensures that the analysis can effectively avoid excessive extrapolation.

3.2. Data Sources and Indicator Selection

The original data was obtained from the China Regional Economic Statistical Yearbook and the China Urban Statistical Yearbook, with a few incomplete data supplemented by the corresponding provincial statistical yearbooks. Both the World Expo and the Asian Games were held in 2010, so 2010 was taken as the starting year for this study; minority autonomous states and regions were also excluded, as these regions are highly heterogeneous from other cities. The microscopic data in this paper come from the database of Chinese industrial enterprises in continuous operation from 2006 to 2016 provided by the National Bureau of Statistics, which includes all state-owned industrial enterprises and non-state-owned industrial enterprises with sales of over RMB 5 million, and the database has a high degree of authenticity, credibility and representativeness.

Remote sensing of nighttime lights originated in the 1970s, and the available nighttime light data include the nighttime light images acquired by various observation platforms such as DMSP-OLS, NPP-VIIRS, SAC-C-HSTC, SAC-C-HSC and LuoJia-101 (developed by Wuhan University, 2018). The nighttime light images from each sensor differ in resolution, time range, etc., and only DMSP-OLS, NPP-VIIRS, and LuoJia-101 stars are currently available for free. In this paper, we use the most used nighttime light data, namely the DMSP/OLS nighttime light time series data from 1992-2013 released by the National Geophysical Data Center (NGDC) of the National Oceanic and Atmospheric Administration (NOAA). A series of corrections are also required for the nighttime light data downloaded from this official website due to issues such as aging sensors and turnover between old and new. The calibration method refers to Cao Ziyang et al. (2015), Zeng Bing (2018), Li Xueping and Gong Lu (2019), and goes through steps such as cropping images, projection transformation, mutual correction and saturation

correction, multi-sensor same year image data DN value correction and multi-sensor multi-year image data DN value correction. Among them, the mutual correction model uses a quadratic function, the F16 satellite data in 2007 is selected as the calibration data, and the model parameters are used as those provided by Xue-Ping Li and Gong Lu (2019).

1). **Data Sources**

The impact of hosting world events on the urban development of Guangzhou and Shanghai is empirically analysed using balanced panel data for 35 large and medium-sized cities from 2006-2015, obtained from the China Urban Statistical Yearbook and the website of the National Bureau of Statistics. The empirical objective of this paper is to use the weighted average of other cities to simulate the urban development of the cities that hosted the world events when they did not host the world events, and then compare it with the real urban development after hosting the world events to estimate the impact of hosting the world events on urban development. As Chinese industries are mainly located in provincial capitals and central cities, and as the synthetic control method requires that the economic characteristics of the other sample cities are as similar as possible to those of Guangzhou and Shanghai, 35 large and medium-sized cities identified by the National Bureau of Statistics are selected as the sample, with Shanghai and Chongqing as the treatment group and the remaining 33 cities as the reference group.

2). **Indicator Selection**

In order to consider the fitting effect of the synthetic control subjects and the robustness of the results, some important factors affecting city progression are included as predictor control variables as far as possible(Liu, Jieyan and Fan, Ziying (2013)), as listed below.

- **relative wage** represents the labour cost of enterprises;
- **GDP per capita** represents the labour productivity of the city;
- **Fiscal expenditure** as a proportion of GDP indicates the degree of government intervention in the market;
- **Population density**: the city's agglomeration effect;
- **The balance of deposits in financial institutions at year's end**;
- **The number of hospital and health centre beds** and **the number of international internet users** represent the cities' financial and health care situation and the information infrastructure situation respectively.
- **Relative Employment Rates**: Number of persons employed divided by the average of all sample cities.
- **Consumption level**.
- **Night-time lighting data** provides an objective picture of industrial production, commercial activity and energy consumption in human society and is used to measure the level of development of regional economies.

4. Key Regression Results

4.1. Regression Results

Although Shanghai and Guangzhou hosted the world event in the same year, there are differences between the two cities in terms of their regional development strategies and transformation and upgrading paths due to their different levels of economic development and location conditions. Nevertheless, this difference does not affect the robustness of the policy assessment results in this paper, as the study does not consider using the previous approach of mixing the two pilot cities, but instead takes an analysis of each city to construct a synthetic control city for Guangzhou and Shanghai respectively. The synthetic control method is a data-driven approach, and it can be used to reflect the urban development impact of an event, regardless of the stage of development of the host city, as long as the synthetic control object is a good fit for the development trend of the city prior to the event. The impact of hosting a world event on the overall development of the city as estimated by the synthetic control method is measured by the difference between the average lighting data for each pilot city and its synthetic control city. In the case of Guangzhou, for example, where the Asian Games will be held in 2010, the urban development effect of the Guangzhou Asian Games is captured by the difference between the total intensity of urban lighting in Guangzhou and the synthetic Guangzhou after 2010.

Due to the fact that Shanghai has the highest share of industrial output in China and other economic characteristics, it was not possible to find a suitable weight to fit the relative industrial output of other cities before the Expo using the relative industrial output as a mechanism for analysing the impact of hosting the Expo on urban development. Nevertheless, it does not affect the next step of the analysis in this paper: according to the line of research by Suji and Hudi (2015) and others, it is impossible to find suitable synthetic controls for policy implementation regions due to the existence of special country and regional situations, but as long as it can be demonstrated that a policy has a significant impact on some countries or regions, then it can be shown to some extent that the policy is effective. In this paper, we can use The alternative method, the double difference method, can be used to estimate the impact of the World Expo on the development status of Shanghai, partially compensating for the fact that synthetic control objects cannot be found for Shanghai.

In analysing the impact of hosting a world event on the city's development, the impact of hosting a world event on industry is examined using the relative output value of industry as a predictor variable, and the impact of hosting a world event on tourism is examined using the relative output value of the tertiary sector as a predictor variable.

4.1.1. the Guangzhou Asian Games

The impact of the Guangzhou Asian Games on urban development. The total intensity of lighting in Guangzhou and the corresponding synthetic control city over the period 2006-2016 is shown in Figure 1(a), where the vertical dashed line is located to indicate the year in which the Asian Games were held. On the left side of the dashed line, the total light intensity of Guangzhou and its synthetic control city are very close to each other, with minimal differences, indicating that the synthetic Guangzhou fits the change path of Guangzhou's urban development very well. On the right-hand side of the dashed line,

the two gradually diverge, with the total light intensity of the synthetic control being lower than that of Guangzhou, and the difference between the two is the policy effect of hosting a world event on industrial shifts, implying that hosting the Asian Games could lead to a significant increase in Guangzhou's urban light intensity compared to a hypothetical Guangzhou without the Asian Games, a "boosting effect" This "incremental effect" suggests that hosting the Asian Games has significantly contributed to Guangzhou's urban development.

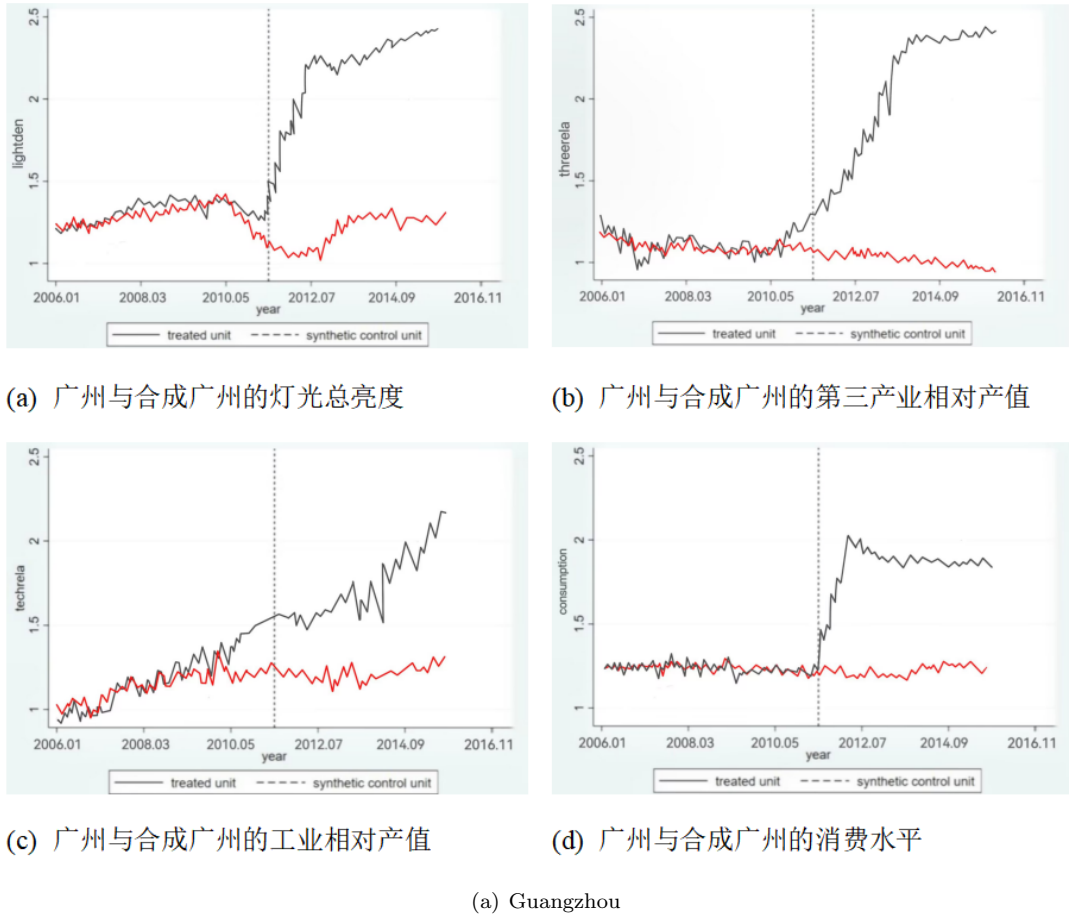


Figure 1: the Guangzhou Asian Games for Urban Development

The effects of the impact of the Guangzhou Asian Games on service, industry and consumption levels are shown in Figure 1 (b), (c) and (d). Before the implementation of hosting the Asian Games, the values of Guangzhou and its synthetic control object were very close to each other and the fit was good, after the hosting of the Asian Games the difference between the two began to widen significantly, the relative output value of the service sector, the relative output value of industry and the consumption level of the synthetic control object were all lower than that of Guangzhou, and the difference between the two. The difference between the two is the effect of hosting a world event on Guangzhou's urban development in these three areas respectively, suggesting that the Asian Games also had a 'boosting effect' on Guangzhou's service sector, industry and consumption potential, all three of which contributed to Guangzhou's urban development.

In terms of the trend of policy effects, all indicators, except for the relative output value of industry,

started to show a horizontal change after 2012 or 2013.

The policy's effect on urban development did not continue to increase, as it began to show horizontal changes after 2012 or 2013. Possible reasons for this are the gradual decline of its short-term boosting effect after the Asian Games, the heavy workload of subsequent reconstruction and recycling of venues, the drastic reduction of the net economic effect, and the weak stimulus of the policy. Existing studies have found that public expectations (Mertens and Ravn, 2011; Wu Huabin et al., 2011), and the intensity of policy stimulus (Zhang Zomin, 2013) have important effects on fiscal policy effects. Theoretically, the development promotion effect of the Asian Games is also affected by public expectations and the intensity of policy stimulus. When the Asian Games is just held and after a period of time, people's expectations of the Asian Games effect are relatively large, which leads to a larger policy effect, but as time advances, it is found that the stimulus intensity of the Asian Games is not as strong as expected, and there is a marginal decrease in the policy effect, so there is a horizontal change in some indicators. The phenomenon of A similar situation exists in the assessment of policy effects by Liu Jieyan and Fan Ziyang (2013), Suji and Hu Di (2015) and Bai et al. (2014).

4.1.2. the Shanghai Expo

(2) The impact of the Shanghai Expo on urban development. As shown in Figure 2(a), the intensity of urban lighting in Shanghai increased significantly before and after hosting the Expo, but there was a period of decline from 2013 onwards. This may be due to the binding nature of site demolition costs; the 5.28 square kilometres of the Expo includes 272 enterprises and institutions with a site area of 4.14 square kilometres, 18,000 households, 31,000 square metres of individual commercial space, and a considerable amount of urban utilities. According to incomplete public data, the average cost of demolition and relocation of the 4.14 sq km units is approximately RMB 4 million per mu, totalling approximately RMB 25 billion, while the cost of demolition and relocation of residents spans a wide range, averaging approximately RMB 600,000 per household, totalling approximately RMB 10 billion; other demolition and financial costs total approximately RMB 3 billion.

When using the relative value of services as a predictor variable, Figure 2(b) shows that on the right-hand side of the dashed line, the relative value of services in Shanghai decreases compared to the synthetic value of services in Shanghai. On the right-hand side of the dashed line, Shanghai's relative service sector output is lower compared to that of synthetic Shanghai, but on the left-hand side of the dashed line, the fit between Shanghai and synthetic Shanghai's relative service sector output is not very good, making it difficult to confirm that the short-term increase in the relative value of Shanghai's service sector is entirely the result of hosting the Expo. In other words, although hosting the Expo reduced the relative output of Shanghai's services sector, this may not be statistically significant. The likely reason for this is that Shanghai's property tax policy has had a crowding out effect on the higher end of the service sector, but not on the lower end of the labour-intensive service sector.

As mentioned earlier, no suitable synthetic controls could be found for Shanghai when using relative industrial output as a predictor variable, and therefore the impact of the Expo on Shanghai's industrial sector cannot be confirmed for the time being. However, as can still be seen in Figure 2(c), the Shanghai

Expo did not change the already established trend of industrial outward shift. The overall results show

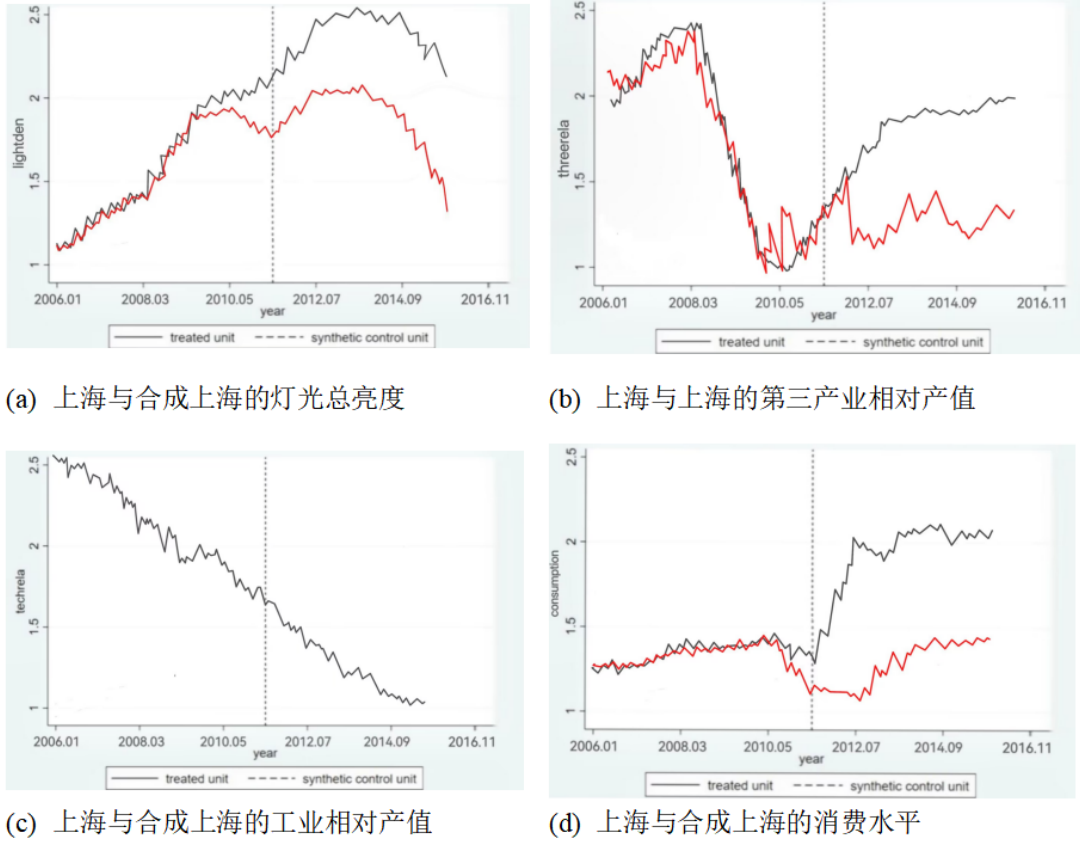


Figure 2: the Shanghai Expo for Urban Development

that the Guangzhou Asian Games significantly increased the relative output and consumption levels of Guangzhou and promoted the city's urban development, and this result was obtained under the condition that the synthetic Guangzhou fit was very satisfactory before the event, which is more convincing. In contrast, the boost to the Shanghai economy from the Shanghai Expo was not sustained and the relative industrial output declined.

4.2. Robustness Tests

Drawing on Suji and Hu Di (2015), the following robustness test will be conducted for the policy implementation city if the synthetic control object fits well with the policy implementation city in the pre-policy implementation period, otherwise the following robustness test will not be conducted for the policy implementation city. Therefore, the results for Guangzhou will be tested for robustness below.

4.2.1. Guangzhou's Robustness Test

Drawing on Suji and Hu Di (2015), the following robustness test will be conducted for the policy implementation city if the synthetic control object fits well with the policy implementation city in the pre-policy implementation period, otherwise the following robustness test will not be conducted for the policy implementation city. Therefore, the results for Guangzhou will be tested for robustness in the following.

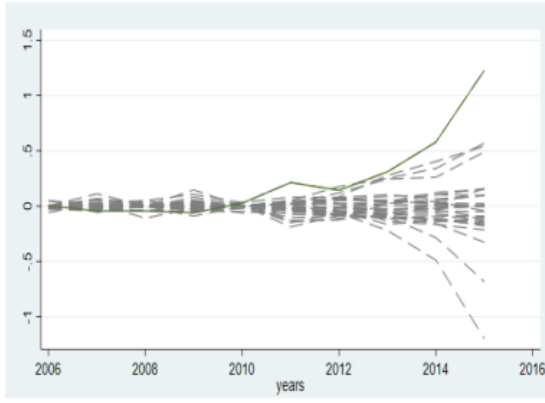
To confirm the validity of the results and to verify that the differences in the predictor variables in the empirical analysis are indeed due to the impact of hosting the Asian Games rather than some unobserved external factors, and that the estimated policy effects are statistically significant, a ranking test similar to the statistical rank test proposed by Abadie et al. (2010) is used. The Permutation Test is used to determine if there are other cities that are in the same situation as Chongqing and what the probability is. The idea of this test is to assume that all cities in the reference group hosted a world event in 2010, construct synthetic controls for the corresponding cities using synthetic controls, estimate the policy effects under the hypothetical scenario, and then compare the actual policy effects generated in Guangzhou with the hypothetical policy effects generated in the control group cities. If the difference in policy effects between the two is sufficiently large, then there is reason to believe that the promotional effect of the Asian Games is significant.

As this approach requires a good fit of the synthetic control object for the city prior to the event, if a city has a poor fit prior to 2010, i.e. a relatively large RMSPE value, even the large predictive variable differences obtained in the later stages of the policy do not reflect the effect of that policy. Therefore, when a city's synthetic control object did not fit well before the policy was implemented, the city's ranking test was no longer analysed. The rationale is that if the synthetic control object fails to fit the predicted variable values before the event is held, the final predicted variable difference obtained is likely to be the result of a poor fit and is not related to the holding of the event. Similarly. If the reference group of cities in the ranking test was not well fitted before 2010, the difference in predictor variables is also removed from the display here. Figure 3 shows the distribution of the differences when the total intensity of urban lighting, the relative output of services and industry and the level of consumption are used as predictor variables respectively.

Taking urban light intensity as a predictor variable, the difference between the predictor variables for cities with RMSPE values exceeding Guangzhou's RMSPE value by a factor of 1.5 prior to 2010 is excluded from the display. It can be seen that prior to 2010, the difference between Guangzhou and other cities in terms of urban light intensity change was not significant, but after 2011, the difference between Guangzhou and other cities began to widen and its distribution was located outside of the other cities. This suggests that the Asian Games increased Guangzhou's urban light intensity and also suggests that there is only a 1 in 30, or 3.33% probability of such a large gap between Guangzhou and synthetic Guangzhou urban light intensity, which is similar to the level of significance in statistical inference, and therefore the increase in Guangzhou's urban light intensity can be considered significant at the 5% level. Similarly, the increase in the relative output of industry, as well as the increase in the relative output of services and total consumption in Guangzhou, can be shown to be statistically significant.

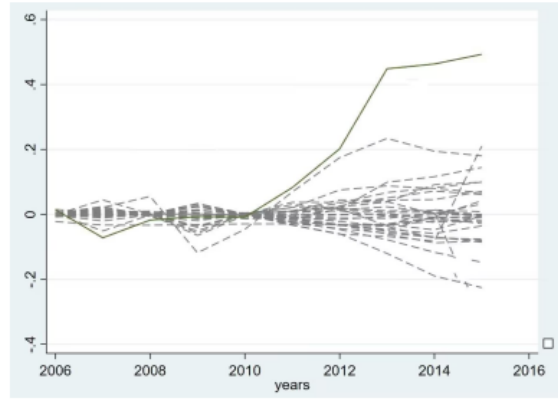
5. Analysis of Impact Mechanisms

The previous empirical analysis shows that hosting world events has a catalytic effect on city development, so through which channels does this positive effect work? It is generally accepted that a city's higher external publicity card will help to attract a greater influx of tourists and boost the service sector; at a micro level, the city's visibility will also help to increase the market recognition of local



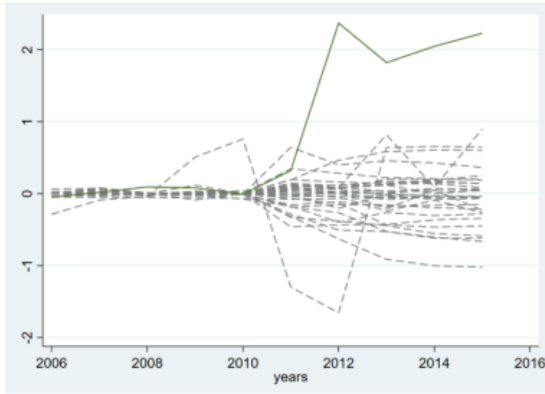
各城市工业相对产值差值分布

注：实线表示广州，虚线表示 RMSPE 值比广州 1.5 倍低的城市。



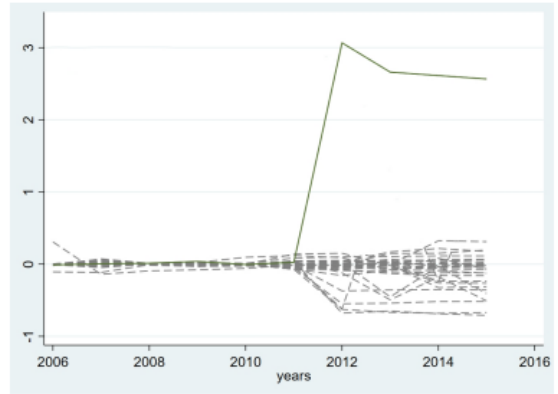
各城市第三产业相对产值差值分布

注：实线表示广州，虚线表示 RMSPE 值比广州 1.5 倍低的城市。



各城市灯光总亮度差值分布

注：实线表示广州，虚线表示 RMSPE 值比广州 1.5 倍低的城市。



各城市消费水平差值分布

注：实线表示广州，虚线表示 RMSPE 值比广州 1.5 倍低的城市。

Figure 3: Difference Distribution by City

products and consumers' willingness to buy them, and boost the city's development. At a micro level, the city's visibility also contributes to the development of the city by increasing the market recognition of local products and consumers' willingness to buy them. We therefore focus our analysis of the impact mechanisms on the development of tourism services, the development of urban infrastructure and the willingness to buy products.

5.1. Tourism Services

We use tourism as an example to analyse the effect of city name change on the development of urban service industries. Based on data on tourism arrivals and tourism revenues in Chinese cities since 2006, subplot (b) of Figure 1-2 presents the effect of city service industry development in Guangzhou and Shanghai before and after hosting a world event, respectively: both domestic tourism arrivals and domestic tourism revenues in the cities rise significantly. This result provides a possible mechanism to explain the contribution of city business cards to city development, i.e. the business card effect of cities

after hosting world events promotes the development of the service sector represented by tourism, which in turn contributes to the overall improvement of the city.

5.2. Development of Urban Infrastructure

From a spatial economics perspective, the development of local transport networks and infrastructure that accompanies a city's name change is another driver of urban development that cannot be ignored, so we further explore this potential mechanism of influence. In this paper, we examine the impact of hosting world events on the development of urban infrastructure, using the example of gross urban industrial output. The results of subplot (c) of Figure 1-figure supplement 2 show that the relative industrial output value of Guangzhou pulls up, yet Shanghai decreases, even as Guangzhou plans ahead for infrastructure development; thus, urban infrastructure development is also a potential mechanism for cities to host world events and promote overall urban development, but it is somewhat heterogeneous across city cases.

5.3. Willingness to Buy Products

As city renaming may also contribute to urban development by influencing the channels through which local light industry products are marketed, we further analyse the impact of hosting world events on product sales of light industry firms in the jurisdictions by examining the micro-level impact of hosting world events in the context of a sample of Chinese industrial firms that have continued to operate between the regions during 2006-2016. According to subplot (d) of Figure 1-2, total product sales in both Guangzhou and Shanghai leveled off after a period of increase, suggesting that hosting a world event increased the total sales of light industry products for enterprises in the region, while the impact was more on the expansion of the domestic market, with no significant change in sales in foreign markets. Further analysis reveals that this city card effect is achieved more through an increase in the number of products purchased by consumers rather than through an increase in the price per unit of product.

6. Conclusions and Policy Tests

This paper assesses the economic effects of city worldcards based on a quasi-natural experiment of hosting a world event. In order to deal with the non-randomness of the selection of the experimental group of cities hosting world events and the difficulty of violating the assumption of parallel trends in the traditional multiplicative difference method, we adopt a purely data-driven synthetic control evaluation idea for the study. In order to address the overestimation bias of economic variables such as GDP and the poor comparability between regions, the article extracts data on the total intensity of lighting in Chinese cities from 2006 to 2016 based on nighttime light images obtained from operational line scan sensors (DMSP/OLS) carried by the US Defence Meteorological Satellite (DMS) and measures the development of cities based on them.

The empirical study of the article leads to the following conclusions: Firstly, based on the increased worldwide visibility of the event, which brings about a significant city card effect, the total nighttime light intensity of the city increases on average by more than 3.10 % per year after the name change. Secondly,

these findings are robust to both placebo tests varying the range of control groups and excluding the effects of confounding policies. Third, further analysis of the impact mechanism found that increased worldwide visibility effectively boosted the city's tourism industry, promoted urban infrastructure and significantly increased domestic sales of light products by local firms. These constitute the three channels of action through which cities hosting world events influence urban development.

1). It will further enhance the growth of the urban economy.

It is also a new combination of the real economy and the virtual economy in the current knowledge economy, and is a new economic form with rich connotations. It can form a new economic growth point for urban economic development. According to the results of the "Quantitative Analysis of the Impact of the Shanghai World Expo on Shanghai's Economy" by the Shanghai Society for Quantitative Economics and the Shanghai Academy of Social Sciences, the Shanghai World Expo will drive GDP growth by an average of about 2 percentage points per year in the next seven years, further enhancing Shanghai's comprehensive urban competitiveness in a sustainable development.

2). It will continue to promote the upgrading and innovation of the secondary industry.

According to the report "The Impact of Shanghai World Expo 2010 on Shanghai's Secondary Industry", the growth rate of Shanghai's secondary industry will increase by 1.1-1.7 percentage points during the preparation and hosting of the Expo. The secondary industry structure and energy level will also be adjusted towards characteristics that are more in line with Shanghai's "Four Centres" objectives. The manufacturing sector will be integrated into the new industrialisation path and increasingly integrated with the service sector, forming new business models and a trend towards productive services. At the same time, world events are a platform and marketing tool to showcase and market China's city to the world, a catalyst to create demand, cast world brands and create new industries and products.

3). It will promote the internationalisation, scale and marketisation of the tertiary sector.

World events can generate diverse international demand and will promote the internationalisation of the tertiary sector in terms of the depth and breadth of services. Ultimately, it will promote the scale, high level of capacity and structural rationalisation of the tertiary industry in the host city. At the same time, world events also pose a serious challenge to a city's current service supply capacity and put pressure on existing service mechanisms for institutional innovation. In order to meet the demand for catering in terms of both "quantity" and "quality", cities must break through administrative monopolies, promote the full opening of the service sector, strengthen market functions and gradually realise the resource allocation and optimisation role of market mechanisms. It will become the fundamental driving force for the continuous development and upgrading of the tertiary industry in the target cities in the new phase.

4). It will significantly raise the level of urban planning, governance and construction

Hosting a successful, exciting and unforgettable world event will place higher demands on urban planning and construction in the host city, and will have a profound impact on the management and operation of the city. In particular, the Expo theme of "Better City, Better Life" will herald a historic

change in the way cities are planned and built. Therefore, the functions and layout of the city will be optimally adjusted according to the needs of the world city. The infrastructure construction focusing on urban transportation will be continuously promoted in accordance with the idea of hub-type, functional and networked, and the urban management with ecological and environmental improvement will be renewed, innovative and strengthened.

5). It will enhance the cultural taste and urban spirit of the host city as a world city.

Culture is the soul of a city, and it is an essential condition for the formation of a world city. A world event not only contains numerous business opportunities, but is also a stage for multicultural exchange and mingling. On this stage, the target city can showcase China's development potential and high degree of openness to the world, promote the city spirit of "sea acceptance" and build a good international image. The Expo can provide a platform for Shanghai and the Yangtze River Delta region, and the Asian Games can provide a platform for Guangzhou and the Pearl River Delta region to learn from the latest developments in human civilisation and to actively learn from the strengths and wisdom of other countries and cities. It will certainly further improve the quality of the citizens, enhance the level of civilisation of the city and cultivate the city spirit of the new era.

Finally, it is important to note that although the study found that international business cards have some economic value, the hosting of world events by cities based on the economic function of international business cards still needs to be carefully re-examined. On the one hand, as the synthetic control analysis is more of a policy effect assessment of a case-by-case reform, it has the disadvantage of being relatively poorly extrapolated. On the other hand, with a limited sample period, our study only observed a short-term effect, but in the long term, is the economic value of this international business card sustainable, and what will be the relative trend of the subsequent development of the host city compared to the non-host city? These questions will also be the focus of subsequent research.

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