

Fallacies and Revisions: Evaluation of Economic Benefits of Development Rights Transfer and Density Bonus --17th and 69th Neighborhoods in Shanghai Hongkou Historic Conservation Districts Regeneration as the Case

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Abstract: Development rights transfer and density bonus (TDR&DB) are often vaguely and implicitly used as a financial compensation tool in historic conservation districts regeneration in Shanghai to compensate to achieve a comprehensive cost-benefit balance. However, this is a misinterpretation and deviation of the effect of TDR&DB. This paper takes the 17th and 69th neighborhoods in Hongkou District as an example, explains the constraints on the cost-benefit of the regeneration, analyzes the market mechanism of TDR&DB, and evaluates the economic benefits of TDR&DB in detail with the help of land value allocation rate method and revenue reduction method. The study concludes that: 1) local governments often have the false illusion of FAR when using TDR&DB, they should restrain their urge to increase FAR and restore the basic attributes of public interest orientation of TDR&DB. They should explore the shift from the land expropriation model to the rights conversion model to reduce the cost of urban regeneration; 2) the idea of cost-benefit balance has obscured the essence and value of TDR, the essence of the TDR is to realize the efficient utilization of overall spatial resources through the dynamic adjustment of development rights. This provides a new way for the introduction of this system into our country; 3) market players can obtain more economic benefits by using TDR&DB, and they should make more “special public contributions” for the regional development. It is suggested to introduce the concepts of “incentive coefficient” and “incentive amount” to accurately evaluate the “special public contributions”; 4) The TDR&DB should take into account their external effects on the surrounding areas, and further research should be conducted to quantify and evaluate the external effects of the receiving lots, so as to promote the practical application of TDR&DB. The above conclusions can provide useful references for constructing a sustainable urban regeneration mechanism in China.

Key Words: Development rights transfer and density bonus (TDR&DB), Evaluation of Economic Benefits, Economic calculations, historic conservation districts, Market mechanism, Urban regeneration

Introduction

Shanghai's "Historical Conservation Block" refers to historical block with distinctive historical architectural features outside designated historical preservation zones. These areas possess a significant number of historically valuable buildings or exhibit unique spatial layouts and streetscapes that merit preservation (Chen, 2018). In Shanghai, there are a total of 250 Historical Conservation Block, covering over 17 square kilometers. Compared to traditional designated historical preservation zones, these blocks may not individually boast prominent historical buildings or architectural significance. However, collectively, they form the foundational fabric of Shanghai's urban landscape. These neighborhoods play a vital role in Shanghai's historical preservation framework and contribute significantly to maintaining the city's distinctive character (Chen et al., 2021). Many of the neighborhood conservation areas are located within the scope of old renovation district in the central urban areas. Within these neighborhoods, residents often face poor building safety, sanitation, and living conditions. There is a strong desire among residents for urban regeneration and improvement of public facilities. However, the regeneration of these neighborhoods faces increasing challenges, such as balancing land acquisition funds, addressing prominent conflicts between residents' needs and heritage conservation. These issues have gradually become tough "nuts to crack" in the urban regeneration process.

In the regeneration of Shanghai's Historical Conservation Block, an innovative approach is adopted, known as "pairing and combining," to integrate the conservation areas with other plots for development. For instance, in the combined development of Blocks 17 and 69, Block 17 is designated as a Historical Conservation Block, whereas Block 69 is situated within a specific urban policy zone.^①In the regeneration process, there is often a vaguely and dimly application of TDR&DB to obtain more development rights, aiming to achieve a balanced cost-benefit ratio. Currently, this practice typically treats TDR&DB as economic compensation tools, lacking theoretical analysis of their market mechanisms, economic benefits, and calculation methods. This approach easily leads to misinterpretation and deviation regarding the role and effectiveness of TDR&DB.

1. Constraints and Bottlenecks in Shanghai's Historical Conservation Block

1.1 Conservation-oriented regeneration breaks the previous cost-benefit balance

Cost-benefit equilibrium in regeneration refers to the scenario where the capital investment in a regeneration project is either less than or equal to the income generated by the project. Unlike typical renovations of old districts, Historical Conservation Block focus on retaining or protecting rather than wholesale demolition which is characteristic of traditional regeneration. The "primarily retention-based" approach to Historical Conservation Block regeneration disrupts the existing balance between input and output of the redevelopment sites, thereby increasing the complexity of regeneration efforts.

Currently, many of the remaining redevelopment sites in Shanghai's central urban areas involve heritage conservation. Although these sites are often well-located, the need for heritage conservation typically results in lower FAR after regeneration compared to sites developed under normal circumstances. As a result, the land value of these sites cannot be fully realized. Meanwhile, as property prices rise year by year, the demolition costs for original residents also gradually increase. The profits obtained from land redevelopment are increasingly unable to cover the costs of resettling residents and the initial development expenses. This situation has led to a significant imbalance between costs and benefits in the regeneration of Historical Conservation Block (Zhu & Gao, 2018) ^[1].

1.2 The previous land use control system makes it difficult to readjust the spatial benefits

Currently, China's existing land use control system is a product of the incremental era. The logic of "rent-investing" under this system often leads it to become a fiscal tool rather than adhering to its original policy intentions when addressing issues related to existing urban regeneration (Zhou, 2022). In fact, while the current land use control

system can prevent the occurrence of negative externalities, it fails to establish a market price for externalities. As a result, it cannot ensure the Pareto optimality in urban regeneration (Wolfram, 1981).

Moreover, it can lead to original residents or developers exploiting "rent gap" through land use changes, exacerbating issues of rent-seeking, gentrification, and the paradox of anti-commons, thus creating social fairness and efficiency imbalances. Original residents and developers can gain significant profits in primary land markets by claiming substantial compensation for land acquisition without bearing the costs of public services. As operational expenses for public services increase post-regeneration, the government's fiscal deficit will further worsen (Zhao and Song, 2021). Simultaneously, the post-regeneration increase in land and housing rents inevitably attracts higher-income individuals, displacing the original low-income residents and leading to urban gentrification.

1.3 The previous policies of TDR&DB cannot make up for the huge cost gap

Currently, the policies governing the regeneration of Shanghai's Historical Conservation Block primarily include the "Shanghai Urban Regeneration Regulations" (2021 version), the "Shanghai Urban Regeneration Planning Land Implementation Regulations" (2017 version), the "Opinions on Deepening Urban Organic Regeneration to Promote Historical Heritage Conservation" (2017 version), the "Implementation Regulations on Planning Land Management to Implement the Opinions on Deepening Urban Organic Regeneration to Promote Historical Heritage Conservation" (2021 version), as well as other relevant preferential policies related to urban redevelopment. These existing policies have to some extent stimulated developers' enthusiasm to participate in urban regeneration. However, their measures for TDR&DB still cannot fully bridge the substantial cost gap in the regeneration of Historical Conservation Block from the government's financial perspective. The currently available transferable and bonus FAR is too small, and the scenarios where TDR&DB can be applied are too limited, making it difficult to address the significant funding shortfall arising from the complex regeneration process.

2. Analysis of Market Mechanisms for Development Rights Transfer and Density Bonus

Transferable Development Rights (TDR) refers to the process of selling or transferring the unused development rights from a "sending plot" to a "receiving plot" through market transactions or government intervention. Typically, the unused development rights transfer among multiple plots in an "equal quantities" manner. Unused development rights refer to the difference between the maximum planned FAR and the actual utilized FAR of a plot.

Density Bonus (DB), on the other hand, involve converting public spaces or facilities into FAR as a reward to market developers. It is a form of compensation from the government to market developers for providing public services. DB are usually provided in the form of "equivalent conversion," where new development rights are rewarded to one or multiple sites (Deng, et al., 2020; Zhan, 2019).

So, how do TDR&DB contribute to the overall social benefits? This paper constructs a marginal benefit function for TDR&DB based on relevant principles of economics, and conducts an in-depth analysis of their market mechanisms. For the sake of convenience in the study, the following basic conditions are set: 1) Assume there are two plots of land with planned FAR of 6.0; 2) Assume the two plots of land have equal areas, and there are no transaction costs; 3) The current FAR of each plot of land have already reached the planned FAR.

2.1 Analysis of the market mechanism of TDR

Assuming plot G is an old community already planned for high-rise residential use, with a planned FAR of 6.0. However, during the development process, it is discovered that there are buildings of historical heritage value that need to be preserved. Therefore, the planned floor area ratio remains unchanged at the current 1.5FAR. In other words, plot G has "unused development rights" corresponding to a FAR of 4.5. Plot H, on the other hand, is for the regeneration of commercial office use in the central urban area, and it has already reached its planned FAR 6.0. Since the utility of historical heritage does not increase with the FAR, the marginal benefit curve of plot G is steeper compared to plot H. This is illustrated in Fig 1.

Now, considering the scenario of TDR, denoting the marginal benefit of plot G as R_G and the marginal benefit of plot H as R_H . When the values of their marginal benefits are

balanced at R_G, R_H , the development rights transfer is completed. At this point, plot G transfers from R_G (1.5 FAR) to R_H (3.5 FAR), and plot H transfers from R_H (6.0 FAR) to R_H' (8.5 FAR). This leads to an increase in overall social benefits, reaching the optimal maximum value. However, for the purpose of historical heritage preservation, there is a need to limit the development of plot G, maintaining its FAR at 1.5 (as shown by positions R_G and R_G' in the Fig.1). This restriction prevents the transfer of development rights between F_G' and F_H' , meaning that the land value income corresponding to $R_G'R_H'N_G'$ cannot be captured, resulting in a "deadweight loss" of social benefits, represented by the black shaded area in Fig 1. Due to the existence of this "deadweight loss," overall social benefits cannot be maximized.

It is important to note that this scenario of TDR may bring about significant negative externalities for the receiving plots. For example, there could be increased pressure on infrastructure in central areas and damage to urban landscape.

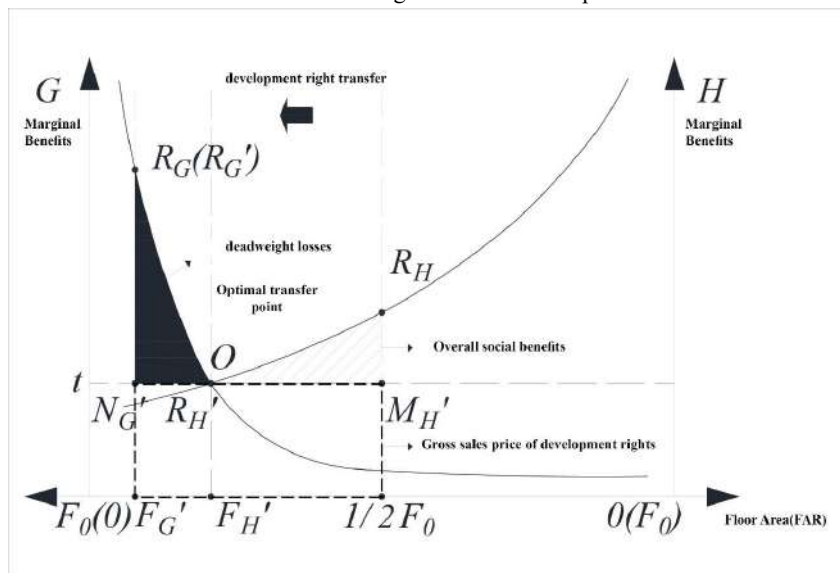


Fig 1 Analysis of the market mechanism of TDR
(Source: by the author)

2.2 Analysis of market mechanisms for DB

Consider a different scenario where plot I is designated for the preservation of historical buildings, with a planned FAR equal to the current FAR (1.5), and plot J is for

commercial office use in the central urban area, having already reached its planned FAR (6.0). Unlike the previous scenario, plot I cannot be developed due to preservation restrictions and thus does not have any "unused development rights." Plot J has already reached its planned FAR, so there is no TDR in this sense.

However, to maintain the historical buildings on plot I, plot J can increase its FAR through DB, thereby obtaining land value income corresponding to " $R_H R_H' F_H' 1/2 F_0$ " in the shaded area of Fig 2. The process of DB not only realizes the public interest within plot I but also enhances the land value income of plot J itself. It is important to note that in reality, the value of DB cannot be infinitely increased considering the impact of development on transportation and municipal infrastructure capacity.

In this scenario, the land value income obtained by plot J through DB should be equal to the cost required for maintaining the historical buildings on plot I. The analysis of this scenario also applies to DB between restricted plots and developable plots, such as those designated for green space protection, ecological conservation, farmland protection. Additionally, DB bring about numerous positive and negative spatial externalities, which require more deeper research.

For instance, protected plots contribute to the enhancement of regional historical value and tourism attractiveness, leading to positive externalities. Conversely, receiving plots experiencing high-intensity development may cause negative externalities such as reduced sunlight exposure for neighboring high-rise buildings, excessive burden on infrastructure, and damage to urban landscape.

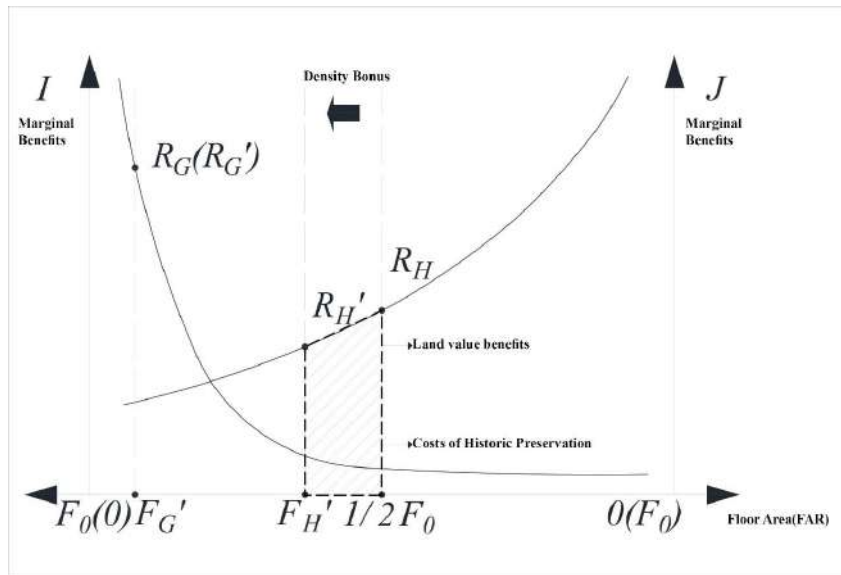


Fig 2 Analysis of market mechanism for DB
(Source: by the author)

This paper argues that relying solely on TDR cannot achieve the maximization of overall social benefits due to the presence of "deadweight loss." Therefore, it is necessary to utilize DB to balance the construction costs of heritage preservation in receiving plots. By enhancing the spatial quality of sending plots and "saving" development costs, DB contributes to the improvement of overall social benefits.

3. Economic Valuation Method for Development Rights Transfer and Density Bonus

3.1 Economic Valuation Method for TDR

The economic value of a piece of land (the sending plot) refers to the spatial value corresponding to the development rights on that land. Therefore, the economic value of development rights reflects the factors contributing to the value of the land. However, if this development rights is used on another piece of land (the receiving plot), its economic value can only represent the spatial value on the receiving plot. It is disconnected from the sending plot, reflecting the value of the receiving plot. In other

words, the price of transferring development rights involve both the price of the sending plot and the price of the receiving plot (Nihata, 2003, p. 128-130).

This paper employs the method of land value distribution rate to conduct economic valuation for transferring development rights. The prerequisite of this method is that the value of land can be determined based on the sum of products allocated according to its most efficient land use. Previous studies have shown that the coefficient of determination for FAR as an explanatory variable is 0.808, which is statistically significant (Yamashita, 2004). Therefore, FAR can be considered as a product for land value distribution. This method assumes that the sending plot and the receiving plot are traded by developers in a free market, while the government possesses complete information and has defined clear and optimal development rights, maximizing the total social output within the plots and their surrounding areas. Consequently, both the sending plot and the receiving plot can be utilized most effectively before and after the TDR&DB. Then, land prices are allocated volumetrically based on FAR, and the price of transferring development rights is determined according to the change in FAR.

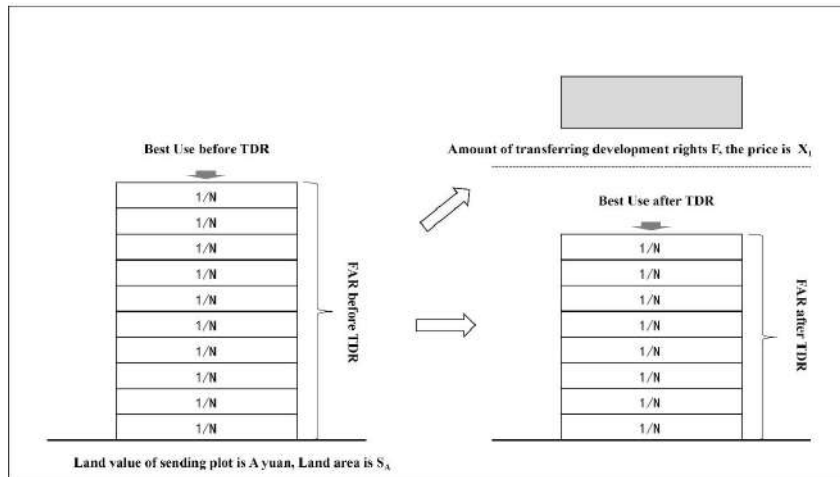


Fig 3: Transfer of development rights of sending land

(Source: TDR of architectural space and its utilization, Yasuo Hibata Nezu)

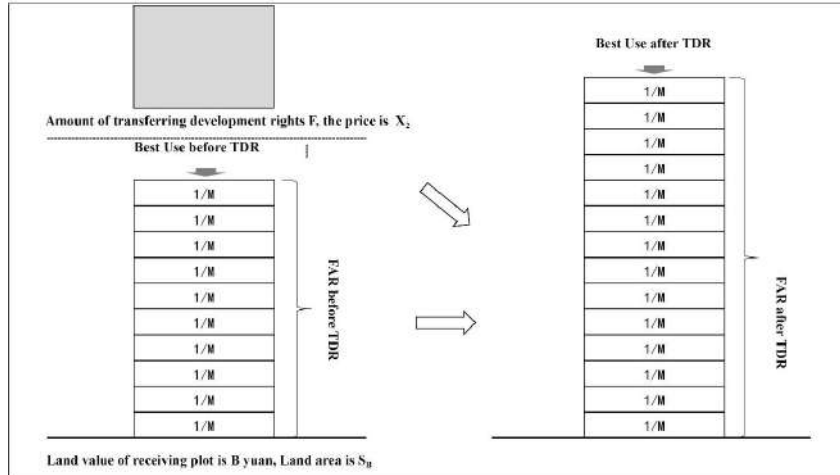


Fig 4: Transfer of development rights of the land parcel

(Source: TDR of architectural space and its utilization, Yasuo Hibata Nezu)

As shown in Fig 3 and 4, the study assumes that the land value of the sending plot is A million yuan, with a land area of S_A and a FAR of N. Correspondingly, the land value of the receiving plot is B million yuan, with a land area of S_B and a FAR of M. Now, a portion of the development rights (F) is transferred from the sending plot to the receiving plot. Therefore, before the TDR, the price of this development rights (X_1) can be calculated using formula (1), while after the TDR, the price of this development rights (X_2) can be calculated using formula (2).

The price of TDR in sending plot $X_1 = \text{land value of sending plot A} \times (\text{FAR before TDR} - \text{FAR after TDR}) / \text{FAR before TDR}$

$$\alpha = (\text{FAR before TDR} - \text{FAR after TDR}) / \text{FAR before TDR} \quad (1)$$

The price of TDR in receiving plot $X_2 = \text{land value of receiving plot B} \times (\text{FAR after TDR} - \text{FAR before TDR}) / \text{FAR before TDR}$

$$\beta = (\text{FAR after TDR} - \text{FAR before TDR}) / \text{FAR before TDR} \quad (2)$$

The latter parts of the two formulas are respectively defined as the allocation coefficient α for transferring development rights from the sending plot and the allocation coefficient β for transferring development rights to the receiving plot. Then, the difference in transferring development rights between the sending plot and the receiving plot is proportionally allocated, resulting in the actual transaction price of transferring development rights. The overall process can be calculated according to Table 1.

Table 1 Valuation Method for Development Rights Transfer

The Price of TDR		
a	b	c = a - b
Sending plot	Receiving plot	Difference
$\alpha \cdot A$	$\beta \cdot B$	$\alpha \cdot A - \beta \cdot B$
Distribution of the difference		The Price of TDR
$d = a / (a + b)$	$e = c \times d$	$f = a - e$
Distribution rate	Distribution amount	The Price of TDR
$\frac{\alpha \cdot A}{\alpha \cdot A + \beta \cdot B}$	$\frac{\alpha \cdot A(\alpha \cdot A - \beta \cdot B)}{\alpha \cdot A + \beta \cdot B}$	$\alpha \cdot A - \frac{\alpha \cdot A(\alpha \cdot A - \beta \cdot B)}{\alpha \cdot A + \beta \cdot B}$

(Source: Source: TDR of architectural space and its utilization, Yasuo Hibata Nezu)

In the calculation process, it is necessary to specify the exact quantity of transferring development rights. According to the requirements of the "Implementation Rules for Strengthening Floor Area Ratio Management and Promoting High-Quality Utilization of Land Resources (2020 Edition)"(Shanghai Municipal Bureau of Planning and Natural Resources, 2020), In the central urban area of Shanghai, the maximum FAR for newly built residential lands is 2.5, while for newly built commercial and office lands, the maximum FAR is 4.0. Therefore, transferring development rights refers to the difference between the planned maximum FAR and the current FAR. For example, if the current FAR of the sending plot is 1.0 and it is planned for residential use (with a planned FAR of 2.5), then the 1.5 FAR development rights can be transferred.

Through the above calculation, we can further clarify the profit and loss of the sending and receiving plots. The sending plot needs to ensure a positive income for the development rights transfer to be tradable in the market. The profit and loss of the receiving plot can be calculated under the condition of setting a certain proportion of

leasing and selling floor space.

3.2 Economic Valuation Method for DB

the land value income obtained by the receiving plot through DB should be consistent with the construction cost required for historical preservation within the sending plot. This paper adopts the income approach method for economic calculation of DB. Assuming that the construction cost of historical preservation includes the reconstruction cost of historical buildings and sites, this cost can be obtained using the following formula (3). Here, C_A represents the unit construction cost of the sending plot, and F_A is the planned construction area of the sending plot.

<p>Historic Preservation Costs = Unit Area Cost in Sending Plot ×Planned Floor Area in Sending Plot $=C_A \times F_A$ <div style="text-align: right;">(3)</div> </p>

The awarded development rights is equal to the construction cost of historical preservation divided by the net present value (NPV) of income per unit area of the receiving plot. The NPV of income per unit area of the receiving plot can be calculated using formula (4). Here, NPV_R is the NPV of income per unit area of the receiving plot. E_t represents the total net income per unit area of the project in the t^{th} year of the receiving plot (in yuan/m²). i is the rate of return. C_B is the construction cost per unit area of the receiving plot (in yuan/m²). If there is a certain proportion of leasing and selling, it is necessary to calculate the net present value V of rental income. Assuming equal annual net rental income for a finite number of years in the future, denoted as A , the NPV of finite-year rental income can be calculated according to the following formula. The bonus FAR is the ratio of awarded development rights to the area of the receiving plot. The economic calculation approach for DB is illustrated in Fig 5.

Awarded Development Rights = Historic Preservation Costs ÷ NPV of Receiving Plot

NPV of Receiving Plot: $NPV_{\text{承}} = \sum_{t=1}^n \frac{E_t}{(1+i)^t} - C_B$

Present value of net rental income for a finite number of years:

$$V = \frac{A}{i} \left(1 - \frac{1}{(1+i)^n} \right)$$

Bonus FAR = Awarded Development Rights ÷ Area of Receiving Plot

$$= \frac{C_A}{NPV_{\text{承}}} \times \frac{F_A}{S_B}$$

(4)

Through the formula for calculating the bonus FAR, it can be seen that the ratio of the unit construction cost of public contribution per unit area of the sending plot to the NPV of income per unit area of the receiving plot is the **DB Coefficient**. This coefficient depending on the nature of the public contribution and the income situation of the receiving plot. The **DB Volume** is determined by the ratio of the building area formed by the public contribution of the sending plot to the base area of the receiving plot. The greater the contribution to the public interest, the larger the volume of the DB.

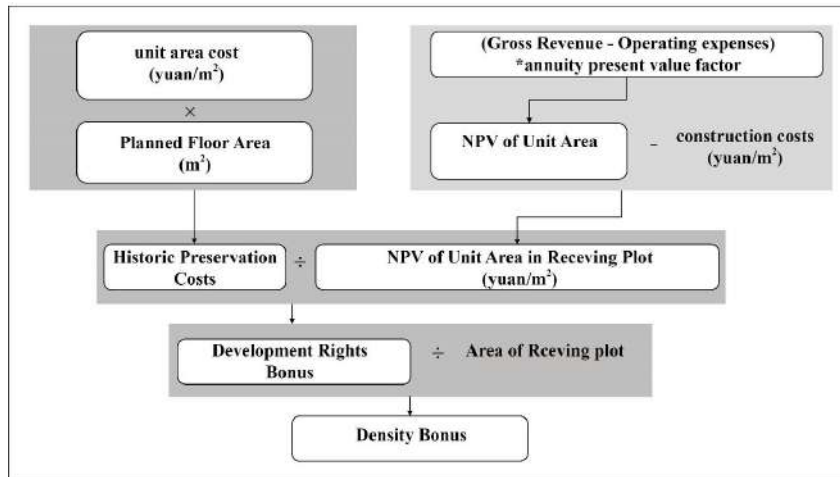


Fig 5 General idea of economic calculation of DB

(Source: by the author)

4. 17th and 69th Neighborhoods as the Case

4.1 Implementation background

The 17th block in Hongkou District stretches from Jiangxibei Road in the east to Haining Road in the south, from Henan North Road in the west to Wujin Road in the north. It covers an area of approximately 39,630 square meters and involves 3,010 households. The area to be acquired for demolition is approximately 62,000 square meters, and a total of 735 households to be relocated, as shown in Fig 6.

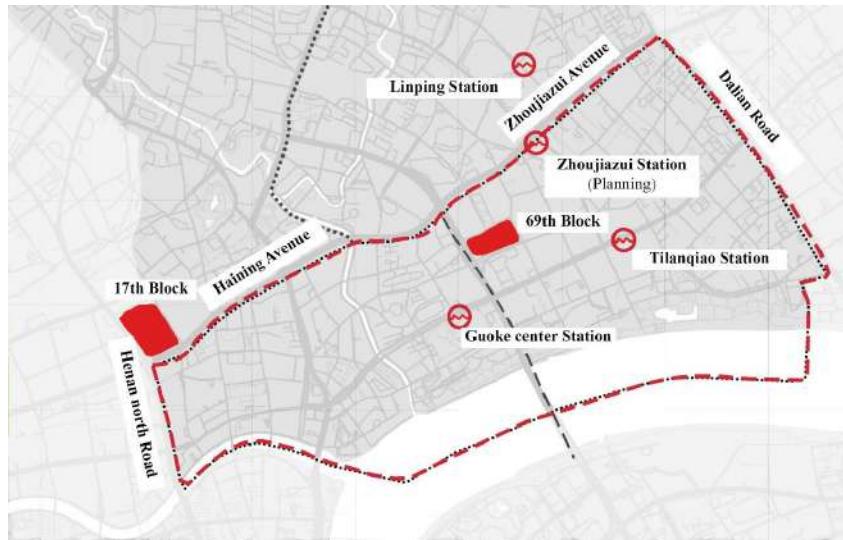


Fig 6: Hongkou District 17 and 69 block locations

(source: https://www.sohu.com/a/441881828_260616)

The houses in the 17th block of Hongkou District have a long history and were designated as the second batch of “Historical Conservation Block” in 2017. The renovation of the area must meet the requirements for historical preservation. In September 2020, the redevelopment site of the 17th block was successfully completed and handed over. At the same time, the urban planning adjustment scheme and approval documents for the 17th block were officially announced (Shanghai Municipal Planning Bureau Document No. [2020] 266). According to the planning scheme, the main land

use type in the 17th block is Class I residential land, with a FAR of 1.1 and a building height of 10 meters.

Located in the core area of North Bund in Hongkou District, Shanghai, Block 69 is designated as land parcel hk300-02 according to the latest approved "Control Detailed Planning for North Bund Area" (Shanghai Municipal Document No. [2020] 39). The planned area of the block is 20,691 square meters, with a land use designation for commercial, office, restaurant, and hotel purposes, without involving historical preservation. The plot FAR is 10.0. According to the urban design of the North Bund in Hongkou, a 300-meter-high landmark building will be constructed here in the future, aiming to create a headquarters base with global influence and benchmark leadership along with surrounding plots.

On December 31, 2020, the land auction announcement was issued (Land Parcel Announcement No.: 202028201). Blocks 17 and 69 in Hongkou District were jointly put up for auction, with a total land area of 58,025.2 square meters. The winning bid was 11.14 billion yuan, and the land use was designated for residential and commercial, restaurant, and hotel purposes.

4.2 Economic calculation

Block 17 has 1.4 FAR transferable development rights, while Block 69 can accept this transferable development rights based on a planned FAR of 4.0.

Based on the land auction and transaction data released by the Shanghai land market, the following assumptions are made: For Block 17, the construction cost per square meter for the preservation buildings is estimated to be 15,000 yuan/m², and the selling price is estimated to be 200,000 yuan/m².

For Block 69, the construction cost per square meter for commercial office buildings is estimated to be 12,000 yuan/m², and the selling price is estimated to be 80,000 yuan/m². The annual rental income per square meter is estimated to be 31,000 yuan/m²/year, with an average vacancy rate of 15%, an operating expense rate of 25%, and a return rate of 5.7%. The evaluation period for commercial office buildings is set at 50 years.

The floor price is determined comprehensively based on the market comparison method and the benchmark land price correction method. The floor price for residential land in Block 17 is 120,000 yuan/m², and for commercial land in Block 69, it is 30,000 yuan/m². Excluding the underground part.

table 2 Calculation of the overall economic benefits of TDR&DB for 17th and 69th block

Overall economic returns (fully rented) (billion yuan)		
a	b	c
Overall returns of Sending plot	Overall returns of Receiving plot	Overall returns
-1.12	-1.59	-2.71
Overall economic returns (fully sale) (billion yuan)		
a	b	c
Overall returns of Sending plot	Overall returns of Receiving plot	Overall returns
-1.12	+4.83	+3.71

(Source: by the author)

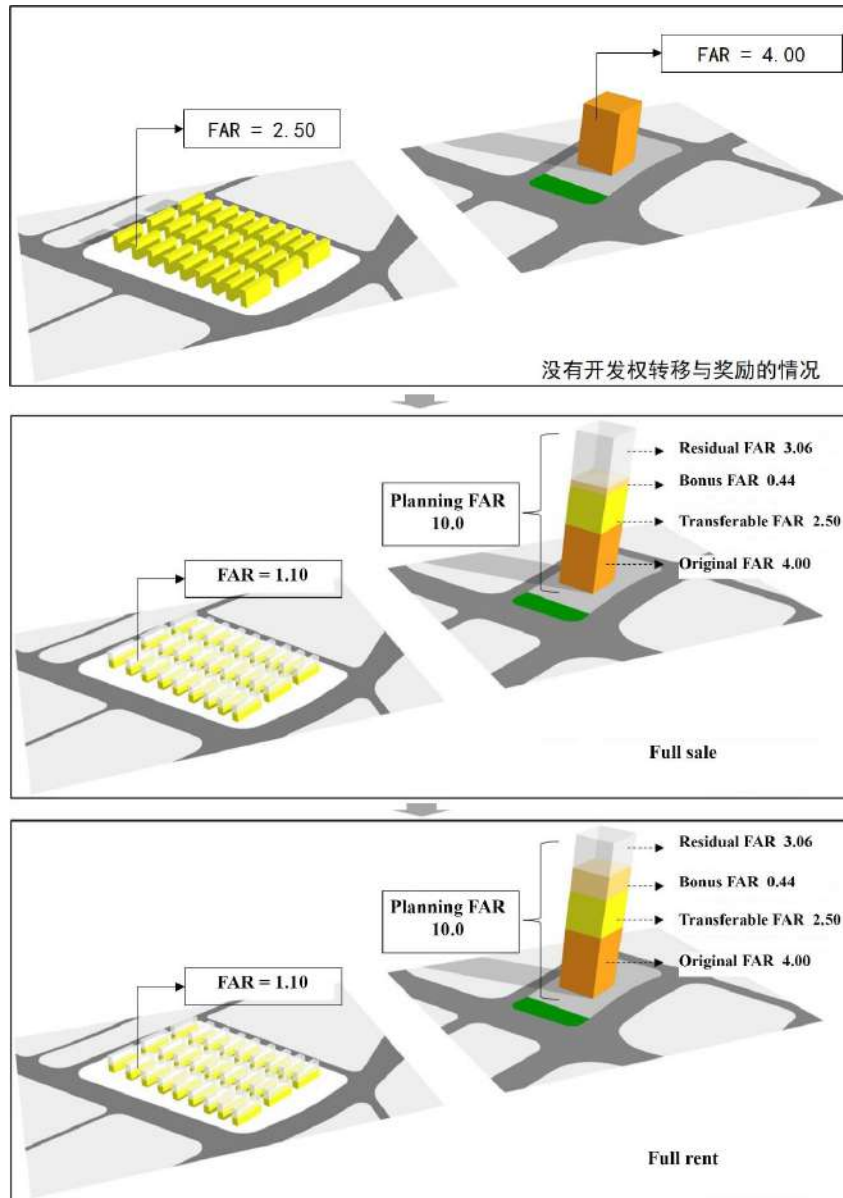


Fig7 Illustration of the changes inFAR before and after TDR&DB for the 17th and 69th neighborhoods in Hongkou District (left: 17th neighborhood, right: 69th neighborhood)

(Source: by the author)

4.3 Discussion of results

Through economic calculation, it is evident that although the selling price of villas in the Hongkou District of Shanghai is relatively high (200,000 yuan/m²), the sending plot still incurs a loss of -1,121,839,000 yuan during the TDR. In a more general scenario, if only the development rights of historical areas are transferred without maintenance and repair, the selling/leasing price of the sending plot will not significantly increase. TDR may even result in greater losses for the sending plot, making it impossible for market transactions. The "deadweight loss" mentioned earlier is the main reason for the losses incurred by the sending plot. This also empirically explains that relying solely on TDR in the renovation of historical areas cannot effectively enhance overall social benefits within the market mechanism. Furthermore, the receiving plot will experience different profit and loss situations depending on the ratio of rent/sales floor area. If all units are leased, there will be significant economic losses (-2,201,214,000 yuan), whereas if all units are sold, there will be significant economic gains (+4,212,787,000 yuan).

The DB can to some extent compensate for the shortcomings of TDR. Not only can it balance the construction costs of historical areas, but it can also enhance the spatial quality and selling price of buildings and environments within the historical areas. This leads to an overall increase in social benefits, reaching up to 3,710,023,000 yuan (while a loss of -2,708,013,000 yuan occurs if all units are leased). Additionally, through calculation, it can be observed that the operational mode of the building has a significant impact on the return rate. Considering the future fluctuations in the usage of office buildings, a cautious approach should still be adopted in handling the DB.

The planned FAR for the receiving plot after the TDR&DB should ideally be around 7.0-8.0. However, the actual planned FAR is 10.0. The main reason for the residual FAR of 2.0-3.0 is that the local government is strongly motivated to increase the FAR to obtain more land fees to offset the costs of demolition and relocation. Another reason is that the planned FAR for the receiving plot is pre-set according to the urban design rather than based on the results of the assessment of TDR&DB.

5. Further Revision and Suggestions

5.1 Revision 1: Back to Public Interest Orientation of TDR&DB

In comparison to local governments, developers are more likely to accept the economic valuation results of TDR&DB. This is because the reduction in FAR reduces the cost of purchasing land, and developers do not need to excessively pursue development rights. They only need to ensure sufficient rent/sale income in the later stages of development. However, from the perspective of local governments, this may not meet their funding gap for demolition and relocation. Unlike Western countries, China cannot increase revenue through property taxes. This exacerbates the difficulty of completing demolition and relocation at the government level. Many local governments resort to seek higher FAR through the TDR&DB in order to obtain "profits" or "income" for government finance. However, this creates a false illusion of FAR. According to Professor Zhao Yanjing's viewpoint, the "cash flow" brought about by increasing FAR cannot be counted as "income" but rather as "financing." Increasing financing levels without synchronously improving the quality of public services will damage the net assets of all original shareholders (homeowners in the city) (Zhao, 2023). It is this false illusion of FAR that prompts local governments to misinterpret the planning policy tool of TDR&DB, turning it into an economic compensation tool to offset land acquisition costs.

The article argues that TDR&DB are oriented towards achieving public interests, aiming to address spatial interest imbalances in specific regeneration scenarios (Zhu et al., 2022). On one hand, there should be restraint the impulse to increase FAR, making TDR&DB back to public interest orientation. For instance, in the regeneration of 17th and 69th blocks, TDR&DB can not only balance the construction costs of preserving historical charm but also enhance the spatial quality and sale price of buildings within the preserved areas. Additionally, they can generate cash-flow income in receiving plots, thereby enhancing overall societal benefits. On the other hand, local governments should explore a shift from the traditional demolition model to rights adjustment model. This involves reorganizing and adjusting the spatial rights before and after regeneration while preserving the spatial rights of original residents, significantly reducing the costs of demolition.

5.2 Revision 2: A New Way For Introducing TDR In China

From the perspective of international experience, the TDR system is designed to optimize spatial resources by coordinating the "unused development rights" from a comprehensive development perspective. However, under China's collective land management system, the concept of "unused development rights" can be considered nonexistent. In contrast, in countries with private land management system in the West, although unused development rights belong to the land holders as legitimate rights, their use still requires authorization from local governments (Chen&Qi, 2023).

This means the utilization of development rights needs to be approved and regulated by local governments through planning, permitting, and project approval processes. From this perspective, whether unused development rights exist or not, dynamic adjustments of development rights can still drive urban regeneration. Therefore, the introduction of TDR system in China is not about simply copying or imitating Western systems, but rather about understanding its fundamental role and adapting it to the local context.

Urban regeneration involves the reconfiguration of overall spatial resources, aiming to optimize the functional layout of the city and enhance the value of lands. The entire process of urban regeneration is essentially a process of reconfiguring, readjusting, and realizing development rights (Zhou & Zhuo, 2023).

Therefore, urban regeneration requires continuous, frequent, and dynamic adjustments of development rights. There are three main pathways for dynamically adjusting development rights in urban regeneration:

- 1) **spatial growth model:** By increasing development rights (FAR), the urban spatial layout can be optimized, achieving compact and intensive urban development and maximizing effective land use.
- 2) **spatial optimization model:** In situations where development rights (FAR) remain largely unchanged, this approach promotes the efficient use of low-efficiency land and upgrades its functions. It helps alleviate pressure on transportation, municipal services, and infrastructure in central urban areas, reducing negative impacts caused by urban land layout.
- 3) **spatial protection model:** Under strict limitations or even reductions in development rights (FAR), this approach focuses on protecting and maintaining

public resources such as historical buildings, natural resources, green spaces, and parks in the city. It aims to enhance the cultural and natural environmental characteristics of the city.

Following this three patterns of dynamically adjusting development rights should be a new and reasonable approach to introducing the TDR system in China.

5.3 Revision 3: More Refined Valuation Method for DB

It is evident that market developers can gain significantly higher economic benefits through DB. The total income without TDR&DB (calculated based on ordinary residential properties at 100,000 yuan/m²) can reach up to 344.982 million yuan at most, while the total income with TDR&DB can reach up to 3,710.023 million yuan at most, nearly 10 times higher. Therefore, market developers should make more special public contributions to the future development of the area. The basic and mandatory public facilities that cannot cover all needs. Local governments can specify and clarify the special public contributions of market developers in the planning regulation.

One misconception in China's DB system is n the oversight of the policy context of "special public contributions," wrongly including some basic and mandatory public facilities in the DB system. This has led to the "misuse" of DB system. Special public contributions can include elderly/child-friendly facilities, walkable neighborhood facilities, low carbon environmental facilities, resilient safety facilities, improvement of central urban area spaces, enhancement of central urban area functions (facilities required for future public welfare development), landscape enhancement, historical preservation (especially in non-historical districts), etc.

To accurately account for "special public contributions," the core principle is that the economic benefits obtained through DB should be consistent with the construction costs required for that specific public contribution. It is recommended to introduce the concepts of "DB Coefficient" and "DB Volume", and conduct economic valuation for each type of "special public contribution." Additionally, establishing technical standards can help avoid waste of urban resources and prevent ineffective construction (Zhuo & Zhou, 2023).

5.4 Revision 4: Reconsidering the External Effects of TDR&DB

It's also essential to consider external effects of TDR&DB on surrounding areas (Costonis, 1973). Typically, TDR&DB involve transferring all "unused development rights" to the receiving plots, allowing which to significantly exceed the original FAR. This sometimes even doubling the FAR, leading to significant negative external effects on transportation facilities, public amenities, infrastructure, landscape, and the housing market. It's necessary to accurately calculate the external effects on the receiving plot based on economic theory when implementing TDR&DB. Currently, due to a lack of quantitative research on these negative external effects, TDR&DB often face criticism for potentially leading to excessive development.

Additionally, the location selecting of receiving plots can help mitigate the impact of negative external effects. For example, in the 17th and 69th blocks, the receiving plot is situated in the North Bund area, which serves as the core carrier of global urban functions in Hongkou District. This area falls under specific policy regulations, effectively reducing the occurrence of the negative external effects. At times, multiple receiving plots can be designated to balance the cost and benefits of special public contributions.

Note ①: Shanghai's specific policy areas include the Central Activity Zone (CAZ), public central areas, innovative function clusters, strategic reserved areas, etc.

Note ②: Volume refers to the total floor area of land for development, and is also an important indicator to measure the amount of development rights.

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