The Impact of Compact City Policies on LandPrices: The Case of Toyama City

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Abstract

This study examines the effects of compact city policies on land prices. Using Toyama City, Japan, as a case study, we apply a difference-in-differences approach to district-level panel data of official land prices from 2001 to 2025. The results reveal that residence-encouraged zones experienced significant land price appreciation after the implementation of compact city policies. Rising land prices expanded the property and city planning tax bases, contributing to the city's fiscal stabilization. The findings suggest that compact city policies can reorganize urban spatial structures as well as enhance fiscal sustainability—an outcome conceptualized as "urban management." This study provides new empirical evidence that compact city strategies in shrinking cities can generate both spatial and fiscal benefits, thereby offering practical implications for sustainable urban planning and local governance. However, there are some research limitations: the study does not consider the balance of expenditure and revenue, the time range of the policy, or the micro-level behavior of households or developers.

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1 Introduction

The construction of sustainable cities has become a crucial global issue. Populations have been increasing in some regions but decreasing in others. Low fertility rates and aging societies are especially urgent issues in developed countries. The United Nations Sustainable Development Goals highlight sustainable urban development, with Goal 11 aiming to make cities inclusive, safe, resilient, and sustainable. Compact cities are regarded as one model of sustainable cities, although the concept itself involves inherent dilemmas between economic growth and social and environmental sustainability (Hofstad, 2012), as well as a paradox between sustainability and livability (Neuman, 2005). Originating from Dantzig and Saaty's (1973) experimental city, the idea of a compact city has since evolved, and generally refers to moderately dense, mixed-use development around a city center, as Dieleman et al. (2004) point out. As Kaido (2001, 2007) notes, discussions about compact cities have also emerged in Japan. Hattori et al. (2017) point out that in regional cities, compact planning has been promoted since the early 2000s as a response to urban shrinkage. Kim (2019) argues that a set of context-specific strategies is needed to cope with its multiple issues. This perspective can be applied beyond urban design to include urban planning.

The OECD (2012) identifies five notable compact cities: Portland, Paris, Vancouver, Melbourne, and Toyama. Unlike the other four cities, Toyama faces population decline and a small urban scale. While the others can be regarded as "expanding compact cities," Toyama represents a rare case of a shrinking compact city.However, few studies have explored the implementation of policies to effectively shrink compact cities. In this study, we focus on the case of Toyama City and aim to fill the research gap between expanding and shrinking compact cities.

Building on the case of Toyama City, early studies empirically clarify how Toyama City's compact city policy attracted residents to residence-promotion districts and they show that it contributed to population increases in the districts which is subject to its original compact city policy (Fujioka and Sakakibara, 2020; Fujioka, 2023). Complementing this evidence, Fujioka (2024) suggests that reducing land costs and providing incentives are essential for promoting compact and sustainable urban development. Fujioka and Sakakibara (2024) show how land readjustment shifted from outward expansion to station- and center-oriented redevelopment under the compact city policy. Collectively, these studies identify what has changed (population concentration and development geography), demonstrate the causal role of policy interventions, and show how Toyama's urban structure has been redirected inward.

However, important questions remain. While existing studies explore the effect of the compact city policy on incumbent retail productivity (Iwata et al., 2021), the relationship between compact cities and amenities (Jung et al., 2026), and the gap between compact city ideals and residents' behavior (Sakamoto et al., 2018), they pay limited attention to the fiscal mechanisms underlying compact city policies. Accordingly, this study focuses on housing costs, as reflected in land prices. Regarding existing research on the relationship between the compactness of a city and housing or land use, Posda (2018) shows that a lower level of public infrastructure in the city leads to a higher level of informal housing and fewer buildings in the formal sector. In such a situation, cities become less compact. Therefore, to create a compact city, controlling the housing sector is important, and it must be reflected in land prices.

We hypothesize that compact city policy can raise land prices. Specifically, compact city policies are expected to enhance accessibility and agglomeration economies in central areas. Consequently, they are likely to raise land prices in the targeted districts compared to those in peripheral or non-designated areas. Rising land prices, in turn, expand the property and city planning tax bases, thereby strengthening the fiscal foundation of local governments. This mechanism is called "urban management" through which compact city policies can contribute to both spatial and fiscal sustainability, even in shrinking cities, such as Toyama.

The remainder of this paper is organized as follows. In Section 2, we discuss the details of Toyama City's compact city policy, including its history. In Section 3, we present the dataset and models to estimate the impact of the compact city policy on land prices. We estimate its impact and present the results in Section 4. Finally, Section 5 concludes.

2 Policy and History

In this section, we review the policy and history of Toyama City and identify the key elements for creating a compact city. Toyama City is the capital of Toyama Prefecture and has 402,166 inhabitants as of August 2025. [1] It was also designed as a core city in Japan. Toyama City is located in the middle of Japan and is part of the Hokuriku area. [2]

Toyama City has six potential problems: population decline and super-aging, urban sprawl, rising administrative costs, car dependency and declining public transport, an increasing proportion of people unable to freely use cars, and transitioning to a low-carbon society (rising CO2 emissions) (Toyama City, 2024). By focusing on these problems, Masashi Mori became the mayor of Toyama City in 2002. He issued the first "Emergency Program to Avoid a Fiscal Crisis" and worked to improve Toyama City's fiscal situation, which would become the foundations for his unique compact city policy.

Toyama City's structure can be illustrated as by the image of dumplings and skewers. Skewers represent public transport offering a higher level of service, and dumplings represent population centers connected by the skewers, allowing pedestrian access to various city amenities. Through this structure, Toyama City tries to revitalize public transport, including railway track lines, and to concentrate on various city functions, such as residential, commercial, business, and cultural buildings along public transportation lines. Reflecting this structure, the compact city policy in Toyama City has three pillars: the revitalization of public transportation, encouraging residents to relocate to zones along public transportation lines, and revitalization of the city center [3].

There are two residence promotion schemes in Toyama City: The City Center Dwelling Promotion Scheme and a scheme to promote dwelling along the public transportation axes. Toyama City has established two residence-encouraged zones for these schemes (city center area and residential promotion zones along the public transportation line), and citizens who live in or move to these zones receive subsidies. The city center comprises 436 ha, and the residential promotion zones along the public transportation line are those located within 500 m of train stations and 300 m of bus stops. All schemes are not only for citi-

[1] Toyama City (*n.d.*). Population of Toyama City. Retrieved October 2, 2025. https://www.city.toyama.toyama.jp/kikakukanribu/kikakuchoseika/tokei/jinkosetai/ jinkosetai.html (in Japanese).

[2] Normally, Hokuriku consists of Fukui, Ishikawa, and Toyama prefectures.

[3] Toyama City (*n.d.*) Toyama's Unique Compact City Management Strategy. Retrieved October 3, 2025, https://uncrd.un.org/sites/uncrd.un.org/files/7th-est$_k$*eynote2.pdf*.

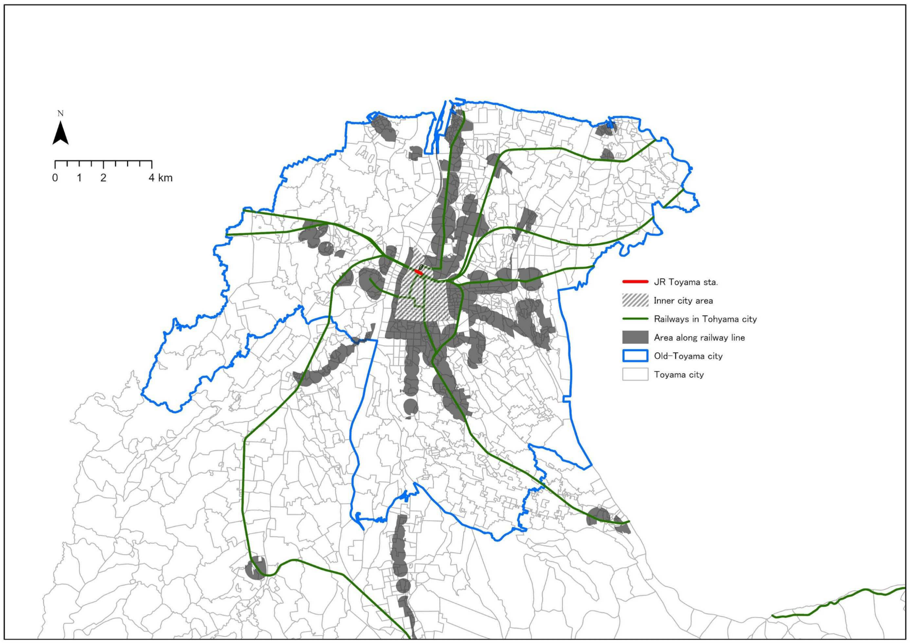

Figure 1: The structure of Toyama City's compact city policy

zens but also for construction companies. The City Center Dwelling Promotion Scheme began in July 2005, and a scheme to promote dwelling along the public transportation axes began in October 2007. Further details on each residence promotion scheme are presented in Table 1.

The above promotion schemes were not implemented in isolation, but were part of Toyama City's broader "urban management" strategy. Therefore, Toyama's compact city policy is not only about concentrating the population and functions but also about rebuilding the city's financial foundation through land value stabilization and reinvestment in core areas. Next, we empirically examine the impact of Toyama City's compact city policy on land prices

3 Data and model

3.1 Data

In this study, we construct a panel dataset of official land prices in Toyama City from 2001 to 2025 to quantitatively estimate the effects of the compact city policies implemented. Data on official land prices were obtained from the

Table 1: Details of Residence Promotion Scheme

Target areas	For whom	Types of schemes
City centers	Citizens	City center housing acquisition support scheme City center renovation assistance scheme City center housing rental subsidy scheme Multi-habitation promotion scheme
	Construction companies	Scheme to promote the construction of apartment blocks in the city center Local excellent rental housing maintenance cost subsidy scheme Scheme to support city center housing conversion Scheme to support stores annexed to housing in the city center City center residential land maintenance promotion scheme Scheme to support and maintain disposal and wastewater treatment system in the city center
Public transportation axes	Citizens	Scheme to support public transportation axes housing acquisition Rent subsidy scheme for single-parent families Public transportation axes renovation assistance scheme
	Construction companies	Scheme to promote the construction of apartment blocks in the public transportation axes Local excellent rental housing maintenance cost subsidy scheme Public transportation axes residential land maintenance promotion scheme

"Digital National Land Information" portal of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan. We use official land prices to estimate the benefits of compact city policies. The MLIT of Japan publishes official land prices for standard sites nationwide as of January 1 each year, with results released every March. Because land price points are reviewed annually, data are not available for every year from 2001 to 2025. Thus, the panel data are unbalanced. The sample size of the panel data is 2164. The official land price data include data on the year, land area, shape, road widening in front of the site, land use, nearest train station, distance to the station from the site, orientation, and availability of gas and water services. In the estimations presented below, we use some information on these characteristics as control variables. [4]

To address this, we obtained railway and station data for lines operating within Toyama City from the National Land Numerical Information database and conducted spatial mapping. We then refine the dataset by calculating the straight-line distance from each land price point to Toyama Station.

As mentioned in Sections 1 and 2, Toyama City has implemented two compact city policies. The first is the "*City Center Dwelling Promotion Scheme*," targeting Toyama Station and the city center. The second is a "*scheme to promote dwelling along the public transportation axes,"* designed to encourage residential settlement along the railway network extending from Toyama Station.

Although we describe this in detail later, it is necessary to distinguish between the areas targeted by the compact city policies implemented in Toyama Prefecture and other areas. Toyama City designated two target areas for its policies to create a compact city. One is a policy called the City Center Dwelling Promotion Scheme. The area designated as the city center dwelling promotion scheme includes Toyama Station, which serves as the hub of Toyama City's transportation network, and Toyama City Hall, the administrative center of the city. The other policy targets areas along railway lines, designed to encourage residential settlement along public transportation routes. We obtained data on these two areas from Toyama City Hall. Figure 1 illustrates the area of the city center dwelling promotion scheme. As Figure 1 shows, this area locates around JR Toyama station, which is the hub of public transportation in Toyama City. Figure 1 illustrates areas of a scheme to promote dwelling along the public transportation axes. These are designed areas that are accessible within walking

[4]See National Land Information Homepage, https://nlftp.mlit.go.jp/ksj/

distance of stations located along the public transportation lines that radiate from JR Toyama Station, which serves as a hub.

We adopt a hedonic approach based on official land prices (*Koji-chika*), relying on the capitalization hypothesis to estimate the impact of each compact city policy in Toyama City. Moreover, we employ the DID approach. We designate official land price points located within each compact city policy area as the treatment group, and those located outside these areas as the control group.

Considering that the City Center Dwelling Promotion Scheme was implemented in 2005, and a scheme to promote dwelling along the public transportation axes in 2007, we treated these as events and evaluated the official land prices (precisely, the changes in official land prices) before and after each event. When employing the DID approach, the so-called parallel trend assumption must hold, meaning that the trends in the treatment and control groups are similar prior to the occurrence of the event. To verify this assumption, we examined the trends in the average land price points for the treatment and control groups in each compact city scheme.

Figure 2 presents the time series of the average official land price points in the City Center Dwelling Promotion Scheme, comparing those within the target area (treatment group) with those outside the target area (control group). Considering that the City Center Dwelling Promotion Scheme was implemented in July 2005, it is sufficient to verify whether the parallel trend assumption holds for the period up to 2005. As shown in Figure 8, the average of the treatment and control groups exhibited roughly parallel trends from 2001 to 2005, whereas the treatment group's average slightly after 2006.

Figure 3 presents the time series of the average official land price points for a scheme to promote dwelling along the public transportation axes, with points within the target area as the treatment group and those outside as the control group, covering the period from 2001 to 2025. Considering that a scheme to promote dwelling along the public transportation axes was implemented in 2007, the averages of the treatment and control groups can be regarded as following similar trends until 2007. Therefore, the parallel trend assumption prior to the event is considered to hold for both compact city policies, and the subsequent analysis proceeds accordingly.

Another important point is that the panel data on official land prices used in this analysis constitute an unbalanced panel. Official land price points are re-evaluated every few years, and the set of points under assessment is periodically

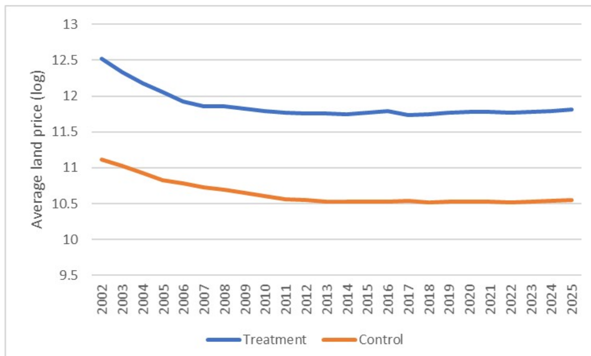

Figure 2: Parallel trends of treatment group and control group (1)

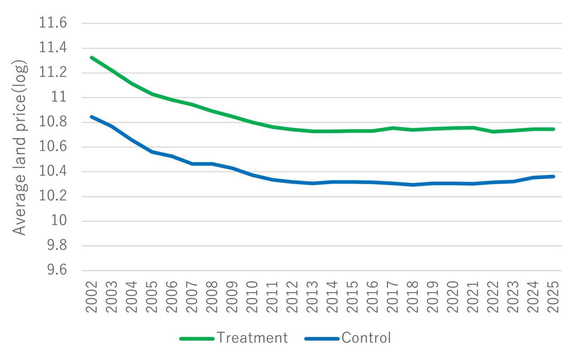

Figure 3: Parallel trends of treatment group and control group (2)

updated; therefore, the observation periods for each point are not necessarily the same. Therefore, the observation periods in this study were uneven, resulting in an unbalanced panel, which requires caution when applying the DID approach. However, the main causes of missing data are points newly adopted as official land price points, or points for which surveys were discontinued. As these do not directly affect the assignment of the treatment and control groups, the DID estimators are considered identifiable without bias.

3.2 The model

We estimated the impact of Toyama's compact city planning on incumbent retailers located in "the City Center Dwelling Promotion Scheme" and "a scheme to promote dwelling along the public transportation axes" using the DID approach. The estimation model is

$$\Delta \ln y_{it} = \beta_0 + \beta_1 Area_i \times Year_t + \beta_2 Year_t + \gamma \mathbf{X}_{it} + \sigma_i + \delta_t + \varepsilon_{it} \qquad (1)$$

where y_{it} is the official land price at point i in year t; We use the first difference in the logarithm of y_{it}, that is, $\Delta \ln y_{it}$, as the dependent variable. As the log difference approximates the growth rate, the estimated coefficients can be interpreted as semi-elasticities. $Area_i$ is a dummy variable representing the treatment group. We designated the official land price points included in each compact city policy area as the treatment group and the other points as the control group. $Area_i$ takes a value of 1 for points designated as the treatment group and 0 otherwise. $Year_t$ is a dummy variable indicating whether the compact city policy was implemented in year t. It takes the value of 1 in years after the implementation of the compact city policy and 0 in other years. Each official land price point was implemented in March of the same year. Because official land prices are assessed every January, land prices in the year of policy implementation do not reflect the effects of the compact city policies. As discussed in Subsection 3.1, the identification strategy relies on the parallel trends assumption, which states that, in the absence of compact city policies, the outcome variable would have followed parallel trends between the treatment and control groups.

For the control variables, we included a set of variables to account for potential confounding factors. Specifically, we control for economic and geographic indicators that may have influenced the dependent variable. Including these controls helps isolate the treatment effect and ensures that the estimated coefficient on the interaction term accurately captures the causal impact of the policy. The control variables include the distance from each point to JR Toyama Station, the distance from each point to the nearest railway or light rail station, land parcel size (in square meters), building coverage ratio (BCR), floor area ratio (FAR), and an urbanization-controlled area dummy. Moreover, σ_i represents the point fixed effects capturing the time-invariant unobserved characteristics of each official land price point, and δ_t denotes the year fixed effects that control for time-specific shocks that are common to all points. The panel is unbalanced because some observation points have been re-evaluated or replaced over time. Following Bertrand et al. (2004), we clustered standard errors at the official land price point level to address the potential serial correlation in the error term.

4 Results

We estimate the fixed-effects model (1) using the dataset described above. To facilitate the comparison, we also present the results obtained from the pooled model.

Table 2 reports the estimated coefficients along with the corresponding standard errors clustered at the official land price point level. The variables absorbed by the fixed effects in the fixed-effects specification are left blank. Significance levels are indicated by asterisks: * $t < 0.1$, ** $t < 0.05$, and *** $t < 0.01$.[5]

Table 2 reports the estimation results obtained from the pooled OLS and two-way fixed-effects (FE) models. Columns 1 and 2 present the results of the pooled model, and Columns 3 and 4 present the results of the FE specification. Columns 1 and 3 correspond to the City Center Dwelling Promotion Scheme and Columns 2 and 4 correspond to a scheme to promote dwelling along the public transportation axes.

Across all specifications, the estimated coefficients on the treatment variables are positive and statistically significant at the 1% level, implying that both compact city policies have contributed to an increase in official land prices within the designated areas. The magnitudes of the estimated effects are larger

[5] Area×Year, Year dummy, Dist. to JR Toyama sta., Dist. to the nearest sta., Parcel size, BCR, FAR, Urbanization area dummy, and Const. in Table denote the Area ×Year interaction term, year dummies, distance to JR Toyama Station, distance to the nearest station, parcel size, building coverage ratio, floor area ratio, urbanization area dummy, and constant term, respectively.

Table 2: Estimation results

	(1)	(2)	(3)	(4)
Area×Year	0.013*** (0.002)	0.006*** (0.001)	0.022*** (0.007)	0.023*** (0.006)
Year dummy	0.062*** (0.001)	0.073*** (0.002)	0.058*** (0.002)	0.065*** (0.006)
Dist. to JR Toyama sta.	−0.002* (0.001)	−0.005*** (0.001)		
Dist. to the nearest sta.	−0.0001 (0.001)	0.002* (0.001)		
Parcel size	−0.002** (0.001)	0.001 (0.009)		
BCR	−0.041*** (0.008)	−0.051*** (0.008)		
FAR	0.002 (0.003)	−0.009*** (0.003)		
Urbanization area dummy	0.006** (0.002)	0.006*** (0.003)		
Const.	0.098*** (0.027)	0.085*** (0.003)	−0.006*** (0.028)	−0.081*** (0.003)
Area FE	no	no	yes	yes
Adj-R^2	0.53	0.52	0.53	0.52
F-value	292.6	278.2	363.8	207.2

under the FE specification (Columns 3 and 4), suggesting that controlling for the unobserved time-invariant heterogeneity across land price points amplifies the estimated policy impacts. Importantly, these results are robust, highly stable, and remain consistently positive and significant across different model specifications, policy types, and the inclusion of control variables. This stability reinforces confidence that the observed effects genuinely reflect the causal impact of the compact city policies, rather than model-specific artifacts.

Regarding the control variables, the results are largely consistent with expectations: land prices tend to decrease with increasing distance to JR Toyama Station, while higher BCRs are associated with lower price growth. Points located in urbanized areas tend to experience higher growth, reflecting the spatial concentration of land demand. These patterns confirm that the model appropriately accounts for geographic and structural factors, thus isolating the causal impact of the policies.

Overall, these results provide robust evidence that compact city policies have effectively enhanced the urban land value in designated areas, which is consistent with both theoretical expectations and fiscal observations. The findings also suggest that the design and location of each policy are critical in determining its effectiveness and offer important implications for future urban planning initiatives.

5 Concluding remarks

This study quantitatively evaluates the effectiveness of compact city policies in Toyama City, Japan. We examine two policy types: the City Center Dwelling Promotion scheme and the scheme to promote dwelling along public transportation axes. Using a panel dataset of official land prices from 2001 to 2025, we estimate pooled OLS and fixed-effects models in which the dependent variable is the first difference of the log official land price, while non-dummy covariates are log-transformed. Across models, the interaction term (Area $\times$ Year) is positive and statistically significant.

The results imply that these policies increased official land prices within the designated areas. More broadly, compact city policies may contribute not only to urban spatial reorganization but also to local fiscal sustainability in shrinking cities by expanding the property-tax base. If we follow the mechanism of "urban management," increases of land prices may result in increases of property and city planning taxes. However, this would require a separate examination.

Several limitations remain. First, this study does not provide a full fiscal cost–benefit assessment comparing revenue gains with policy-related expenditures, such as subsidies. Second, we do not explicitly model the timing and dynamics of policy effects beyond the post-policy indicator. Third, because we rely on official land price data, we do not directly observe household or developer behavior. Future research should incorporate micro-level mobility and housing transaction data, together with spatial network measures, to clarify the mechanisms driving land value changes.

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