行政院國家科學委員會專題研究計畫 成果報告

不動產估價成本法中重要觀念的討論與實證(第 2 年)
研究成果報告(完整版)

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中 華 民 國 100 年 11 月 03 日

中文摘要： 台灣重課土地輕課建物的制度,體現了土地稅調節土地利用的精神,經驗足供其他國家參考.但是執行過程中,也遭遇許多制度設計及執行上的問題.
台北市房價高漲,但是有限的土地供給也加深了問題解決的困難.雖然政府積極推動都市更新,政策成效相當程度受到市場力量的影響.

英文摘要： A split-rate property tax taxes land at a higher rate than buildings. The anticipated results of this tax include: more intensive use of capital and labor, increased productivity of land parcels, and increased land prices. Despite theoretical advantages, not much literature has reported on the institutional designs needed for implementing a split-rate tax and the common difficulties encountered to date. Taiwan's considerable experience in employing a split-rate property tax warrants attention from countries interested in such a tax structure. In Taiwan, the self-assessment of land value by an owner does not appear to be a practical design. In contrast, the land value sections that expedite assessment have performed satisfactorily as far as tax equity is concerned. However, the present assessment rules do not account for the significant price effects of partial land ownerships. Finally, the difficulties in partitioning land and building values have weakened the strength of a split-rate tax in intensifying land use.

It is concluded that, first, the supply of building spaces does not seem to be able to lessen the escalating housing price. In addition, not only those old neighborhoods with aged buildings but also the pricey neighborhoods have observed most activities of teardowns. Third, buildings made of concrete tend to be replaced significantly earlier than its end of physical life. In contrast, a notable proportion of brick and wood buildings stand longer than their physical life. Fourth, a substantial number of new spaces are supplied on the raw land of the outer areas. But few new spaces are supplied to the deteriorating areas where redevelopment is in urgent need. Fifth, no favourable prospect of labour or housing rental market is in a near sight, and

therefore a timely and significant amount of new housing supply have become essential for Taipei's continuing leading edge. Finally, with the shrinking population islandwide including Taipei, the lack of incentive to redevelop deteriorating old neighborhoods might lead to a further decline of the inner city and financial difficulties with providing public facilities there.

行政院國家科學委員會補助專題研究計畫成果報告

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中　華　民　國　100　年 10 月 31 日

Implementing a Split-rate Property Tax: The Taiwanese Experience

Abstract

A split-rate property tax taxes land at a higher rate than buildings. The anticipated results of this tax include: more intensive use of capital and labor, increased productivity of land parcels, and increased land prices. Despite theoretical advantages, not much literature has reported on the institutional designs needed for implementing a split-rate tax and the common difficulties encountered to date. Taiwan's considerable experience in employing a split-rate property tax warrants attention from countries interested in such a tax structure. In Taiwan, the self-assessment of land value by an owner does not appear to be a practical design. In contrast, the land value sections that expedite assessment have performed satisfactorily as far as tax equity is concerned. However, the present assessment rules do not account for the significant price effects of partial land ownerships. Finally, the difficulties in partitioning land and building values have weakened the strength of a split-rate tax in intensifying land use.

Keywords: split-rate property tax; self assessment; land value sections

The Basics of Taxes on Land and Buildings in Taiwan

A split-rate property tax taxes land at a higher rate than buildings. This tax is widely believed to result in more intensive use of capital and labor, an increase of the productivity of land parcels, and an increase of land prices (Cohen and Coughlin, 2005). A split-rate property tax is often seen as a deviation of a uniform-rate property tax toward a pure land tax. As a result, it shall exhibit, to a certain extent, the merits that a pure land tax is expected to maintain.

As land is fixed in supply, tax that falls upon land will not affect its supply and will be paid by the owner in full. A land owner's decision is not distorted and no deadweight loss or excess burden arises. In addition, given that the tax revenue remains unchanged, the shift from a uniform-rate to a split-rate tax allows less reliance of revenue resources on buildings, thus demanding a lower rate on buildings. In this regard, a split-rate tax is, in contrast to a uniform-rate tax, expected to keep down the efficiency loss and stimulate investment on buildings. A reduction in taxes on buildings is thought to attract additional capital in the form of more intensive land use (Schwab and Harris 1998), for example, a taller building on the same site. From 1979 to 1980, Pittsburgh changed its property tax system by raising the tax rate on land to more than five times the rate on buildings whilst the rate on buildings remained unchanged. The city later saw a substantial increase in building activities in comparison to a number of similar cities (Cohen and Coughlin 2005).

Not only has the intensity of land use affected by rate structure aroused concern, but also, the timing of land development is an issue. It is widely agreed that if land is assessed for taxation purposes on the basis of its highest and best use at each point in time and irrespective of its current actual uses, the tax imposed on land will not affect land owner's decision with respect to land development. In other words, a use-independent land value tax will not distort the economic decisions as far as timing of land development and, consequently, land use are concerned. The above conclusion, however, depends on the assumption that the current holder of land has access to either cash or credit sufficient to cover taxes and other holding costs, and can thus postpone development to achieve a larger payoff (Dye and England 2010). In addition, if the present land owner cannot afford paying tax, the land will be sold to someone who is more readily able to afford the tax. Thus, this land is transferred to the person who pays the highest price. As far as land use is concerned, this result

is efficient.

Despite the appealing nature of a split-rate property tax in theory, not much literature has reported on the institutional designs needed for its implementation and the difficulties often encountered. Taiwan has a wealth of experience in implementing a split-rate property tax. The country's considerable experience warrants attention from countries interested in this tax structure.

The tax on land in Taiwan intends to take away some of the income stream from land that is given in the form of nature. This tax is imposed on the value of land, and the value is derived from the ability of land to produce income, either in the form of agricultural products or through rental allocation. Such reasoning implies that the tax base is not considered to be the market value of land, but the imputed value based on its productivity. Market value will include both elements of productivity-based and expectation-based values. The former is the value on which land value tax is based, but not the latter (Yin 2005: 115-120). This tax base is theoretically sound; however, it is practically difficult to define. The local land administration department assesses the parcels of land and announces the declared value for taxpayers' reference. Taxpayers are then given the opportunity to report the value of their land to the department. If a taxpayer's reported value is between 80 and 120 percent of the government's declared value, the reported value will be the tax base. If the reported value is over 120 percent of the declared value, only 120 percent of the declared value will be the tax base. In contrast, if the reported value is less than 80 percent of the declared value, the government is entitled to purchase the land at the reported value or use 80 percent of the declared value as the tax base. If the taxpayers do not submit the reported value during the specified period of time, 80 percent of the declared value will automatically become the reported value (Article 16 of Equalization of Land Rights). The value of land will be reassessed every 3 years, and reassessment will be postponed if necessary (Article 14 of Equalization of Land Rights).

The tax rate on land is a combination of proportional and progressive types. There is a threshold of land value set for each city (county). The threshold value is the average value of a site of 700 square meters in the respective city (county). This threshold value is estimated by dividing total land values by the total areas in a city (county) in square meters multiplied by 700, excluding industrial, mining, agricultural, and tax-exempted land. All parcels of land in a city (county) under the same ownership of a person will be taxed together. For an owner whose summed value of

all parcels of land in a city (county) is below the threshold value, the basic tax rate is 1 percent. For an owner whose summed value of all land parcels is in excess of the threshold value, a progressive rate is imposed. If the summed value of land parcels is less than five times the threshold value, in addition to the 1 percent portion, the bracket of value over the threshold value will be levied at 1.5 percent. If the summed value of land parcels is over 5 times but less than 10 times the threshold value, in addition to the 1.5 percent portion, the bracket of value that is over 5 times the threshold value will be levied at 2.5 percent. If the summed value of land parcels is over 10 times but less than 15 times the threshold value, in addition to the portions of 1.5 percent and 2.5 percent, the bracket of value that is over 10 times the threshold value will be levied at 3.5 percent. If the summed value of land parcels is over 15 times but less than 20 times the threshold value, in addition to the portions of 1.5 percent, 2.5 percent and 3.5 percent, the bracket of value that is over 15 times the threshold value will be levied at 4.5 percent. If the summed value of land parcels is over 20 times the threshold value, in addition to the portions of 1.5 percent, 2.5 percent, 3.5 percent, and 4.5 percent, the bracket of value that is over 20 times the threshold value will be levied at 5.5 percent. In addition, a preferential rate of 0.2 percent is applied to an owner-occupier whose site is not in excess of 300 and 700 square meters in urban and rural areas, respectively. The tax progressivity is aimed to reduce monopoly of land, facilitate transactions, and lessen wealth inequity. The tax structure has changed several times in history, yet the progressive form remains. A closer look (see Table 1) will, however, reveal that the number of value brackets is reduced and the highest rate decreases, thus weakening the degree of progressivity.

Table 1 Rate Structure of Land Value Tax 1949-1989

	1949	**1954**	**1958**	**1964**	**1968**	**1972**	**1977**	**1989**
Basic Rate	1.5%	1.5%	0.7%	1.5%	1.5%	1.5%	1.5%	1%
Bracket I	1.7% <5 times	2% <4 times	1.2% <5 times	2% <5 times	2% <5 times	2% <5 times	2% <5 times	1.5% <5 times
Bracket II	2% (5-10) times	2.5% (4-8) times	2.2% (5-10) times	3% (5-10) times	3% (5-10) times	3% (5-10) times	3% (5-10) times	2.5% (5-10) times
Bracket III	2.5% (10-15) times	3% (8-12) times	3.2% (10-15) times	4% (10-15) times	4% (10-15) times	4% (10-15) times	4% (10-15) times	3.5% (10-15) times
Bracket IV	3% (15-20) times	3.5% (12-16) times	4.2% (15-20) times	5% (15-20) times	5% (15-20) times	5% (15-20) times	5% (15-20) times	4.5% (15-20) times
Bracket V	3.5%	4%	5.2%	6%	6%	6%	6%	5.5%

	1949	1954	1958	1964	1968	1972	1977	1989
	(20-25) times	(16-20) times	(20-25) times	(20-25) times	(20-25) times	(20-25) times	(20-25) times	>20 times
Bracket VI	4% (25-30) times	4.5% (20-24) times	6.2% >25 times	7% >25 times	7% >25 times	7% >25 times	7% >25 times	
Bracket VII	4.5% (30-35) times	5% (24-28) times						
Bracket VIII	5% (35-40) times	5.5% (28-32) times						
Bracket IX	5.5% (40-45) times	6% (32-36) times						
Bracket X	6% (45-50) times	6.5% >36 times						
Bracket VI	6.5% >50 times							
Owner-occupied Land				1%	0.7%	0.7%	0.5%	0.2%

Source：Yu and Wang (2008）

Building tax is levied upon a variety of houses attached to a site and associated structures that are expected to enhance the value of houses. The tax base is the present building value. Determination of the present building value shall take account of (1) construction materials and purposes of buildings; (2) building durability and depreciation; and (3) locational adjustment factor, including conditions with respect to business activity, traffic, and supply of and market for buildings where the taxed building is located. The present building value is the result of considering the above factors and can be shown as Equation (1).

Present building value = replacement costs of building per square meter * (1-building age * annual depreciation rate) * locational adjustment factor * floor areas…… (1)

Building tax rates vary and depend on the purpose(s) of a building. Furthermore, building tax rates are allowed to be set by a city (county), subject to a range stipulated by the central government. Table 2 provides the details of building tax

rates. The proposed rate for a city (county) must be approved by the local council comprised of elected politicians. The majority of cities (counties) have historically adopted the lowest rates.

Table 2 Rates of Building Tax

		Tax Rates	
		Min.	**Max.**
Residential use	Non Owner-occupied	1.2%	2%
	Owner-occupied	1.2%	
Non-residential uses	For business	3%	5%
	private hospital, clinic, firm…etc.	1.5%	2.5%

In the context of local taxation, over the last 10 years or so, land value tax and building tax have contributed to approximately 20 to 25 percent of local tax revenue, respectively. The tax contribution from land is only slightly more than housing tax, by a margin of 1 to 3 percent. Put together, 40 to 50 percent of local tax revenue comes from land and building tax in the form of annual property tax (see Table 3).

Table 3 Tax Contribution from Land and Buildings 2000-2009 (Taiwan)

Years	Property Tax		Property Tax as % of Local Tax
	Land Value Tax	Building Tax	
2000	22%	19%	41%
2001	25%	24%	49%
2002	24%	22%	46%
2003	22%	21%	43%
2004	21%	19%	40%
2005	21%	19%	40%
2006	21%	20%	41%
2007	22%	20%	43%
2008	24%	22%	46%
2009	24%	23%	47%

Taiwan's land value and building taxes appear to fit all the features of a standard split-rate property tax: the rate on land is higher, if a progressive rate is applied, relative to that on buildings. In addition, the taxes on land and buildings combined contribute to a significant share of local taxation. To go further than a standard split-rate property tax, Taiwan has employed banded progressive rates on land. Not only does the efficiency of land uses appear to have elicited concern from the

government, but also, the equity of distribution of land ownership has caused apprehension. In addition to the explicit features previously mentioned, a number of associate designs to facilitate this tax system merit close inspection.

Practicing the Split-rate Tax

The land administration department in each city (county) is responsible for valuing land. Properties with similar attributes, land use, special amenities, structure conditions, and proximities to transportation and other facilities, and close-in location, etc., are grouped together and assigned to the same land value section. In 2010, for example, a total of 3,416 land value sections exist in Taipei.

Assessors from the local land administration department are required to frequently collect price and related information from real estate agents, financial institutions, and other property professionals. Assessed land value for individual properties is derived by subtracting from the sales price of an improved property present building value. The present building value is determined by taking into consideration the replacement costs, the value effects of building depreciation, interior decoration, and expenditures on equipment spent during construction, and expected profits of capital investment. The figures for interior decoration, equipment costs, expected profits, as well as some other numbers, are left to the judgement of the local assessors, and naturally, to an extent, are at their professional discretion. It is worthwhile to note that present building value for land value taxation differs from the present building value as the tax base of building tax. These tax values are assessed by different departments and for different purposes. Valuation of land, as described above, is an application of the extraction method (Appraisal Institute 2008:366) or land residual approach in appraisal literature. The median of estimated land values per square meter for sampled property sales in a land value section is designated as the representative sectional land value. The sectional land value is indicative of the general price level for improved sites within a section. For those properties facing thoroughfares, benefits of easy access to traffic flow are also taken into account. Figure 1 exemplifies land value sections in a growing neighborhood where the Taipei 101 building, currently the second tallest building worldwide, is located. The site the Taipei 101 building occupies is number 56-5, valued at New Taiwan dollars (NTD) 271,000/m^2 [approximately U.S. dollars (USD) 8,488/m^2] in 2007 and 325,000/m^2 (approximately USD 10,179/m^2) in 2010 as the tax base for land value taxation. This neighborhood was within the newly developed east end of Taipei, wherein a large sum of public money was poured, thus the overall conditions of sites are similar. Differences among sites with respect to activity density, street width,

traffic and passenger flows, etc. are easy for the land administration department to identify, and consequentially, to group into a small number of land value sections. In comparison, Figure 2 demonstrates an old neighborhood in the previously developed west end of Taipei. This neighborhood is full of small shops alongside narrow and even one-way streets. The intrigue and subtlety of development in this locality led to the wide variations in land values, even in a small area. As a result, a greater number of land value sections are needed to take into account the price differences. Readers might also have noted that the overall level of assessed land value in the old neighborhood is materially lower than that in the newly developed neighborhood.

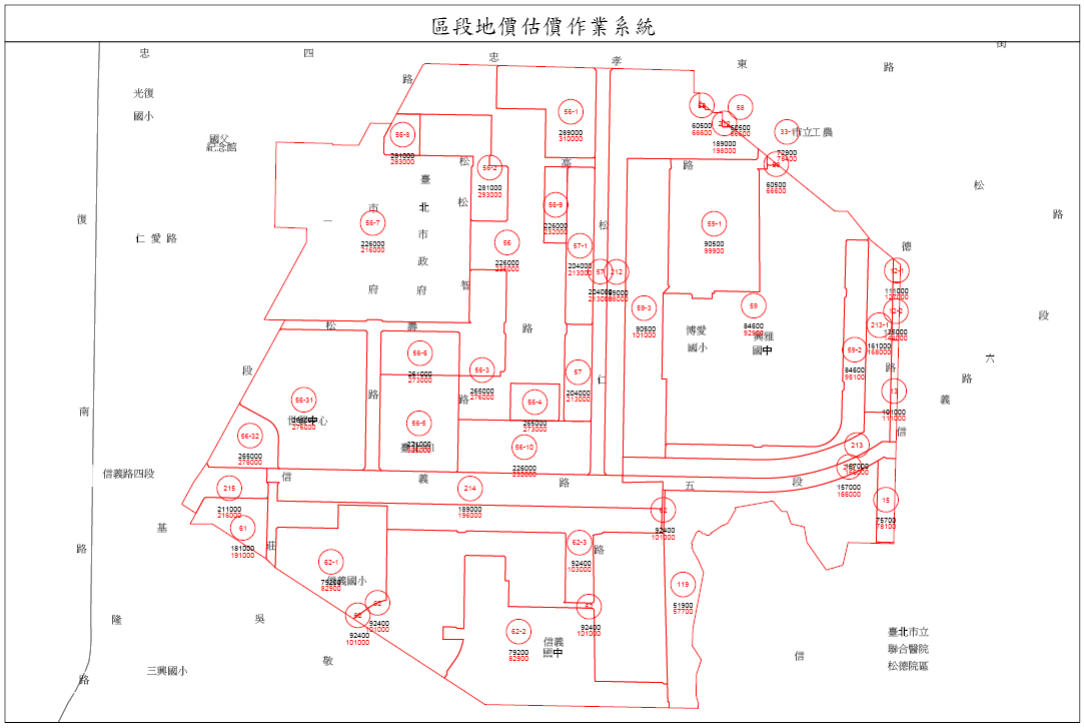

Figure 1 Land Value Sections in a Newly Developed Neighborhood

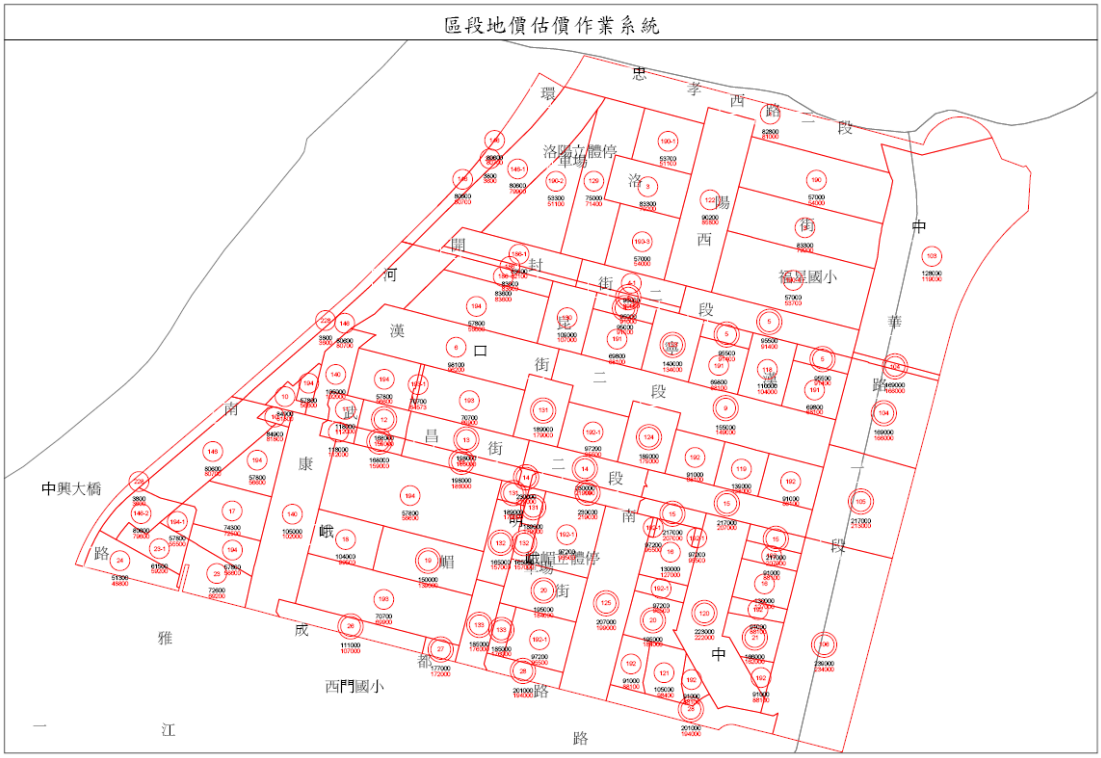

Figure 2 Land Value Sections in an Old Neighborhood

Valuation results and supporting evidence are required by law to be presented to an expert committee. The committee is composed of 17 members, including 7 officials from various departments within the city (county) government and 10 appraisal-related professionals appointed by the city (county). The appointment is on a 3-year term. This committee has the authority to make changes to the valuation results when its members deem it necessary. The valuation results cannot be announced to the public without the approval of committee members. Figure 3 indicates the results of land valuation for Taipei City in 2010. The levels of land value are expressed in different colours. The darker the colour, the more expensive the land parcels are. The distribution of colours coincides with the development patterns of this city. Taipei started its development from the west end by the river and gradually expanded east. Also, this city is a basin surrounded by mountains. The relatively expensive areas primarily cluster in the commercial and office districts. Moreover, the least expensive areas are those farther away from the shopping and employment centres. In addition to the annual land value tax, the government is capable of imposing a tax on idle land. Idle land is defined as a parcel that is within an area where public infrastructures, for instance, roads, sewage, electricity, and water, are ready but no building is yet constructed on it; or a parcel with a building on it but the value of this building is less than one-tenths of the declared value of the site, and additions or new construction is deemed necessary by the city (county)

government. The idle land tax of a site is two to five times the amount derived by multiplying its land value tax base by 1 percent the basic rate (progressive rates are not applied).

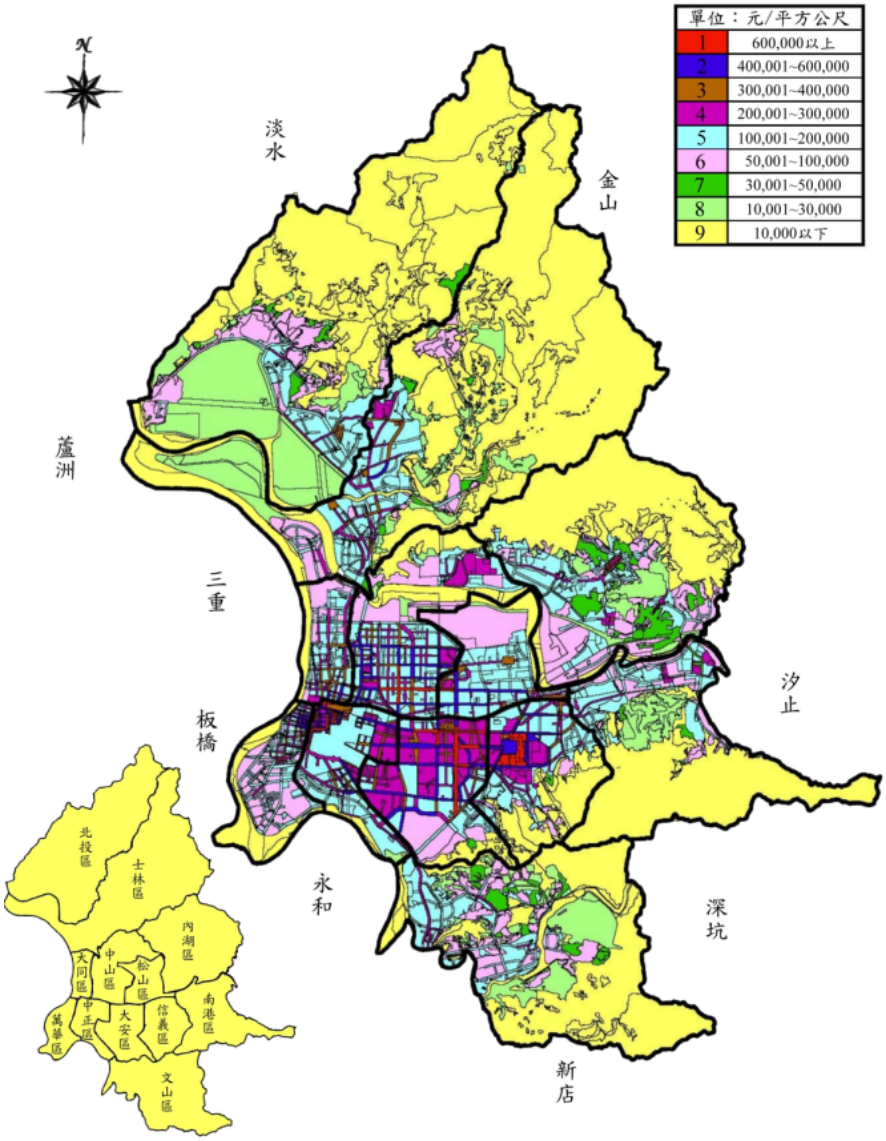

Figure 3 Distribution of Assessed Land Values across Taipei City in Year 2010

In contrast to land, building values are estimated by the revenue service department of a city (county). The present building value equals replacement costs new, less accrued depreciation. A standard replacement costs per square meter and annual depreciation for buildings of a variety of materials, such as concrete, steel, brick, et al., are specified by the respective cities (counties). In addition, supply of and demand for buildings and the price of substitute buildings are also taken into consideration to adjust for the local market differences. The figures of replacement costs, annual depreciation, and adjustment factors are reestimated and made open to the public every 3 years.

Similar to valuation of land, valuation results of buildings are submitted to an expert committee for approval. This committee is composed of governmental representatives and professionals in related domains from outside of the city (county) government. At least two-fifths of the committee numbers must be considered external professionals.

How Well this System Functions

On the face of Taiwan's split-rate tax system, land, except that under the basic rate, is taxed at a higher rate than buildings, and subject to a banded progressive framework. Furthermore, a preferential rate is applied to owner-occupied sites, which are under a certain size within a city (county). These features seem to suggest a tax of land that functions to incentivise denser land use, discourage land concentration, and promote ownership at the same time. Below, empirical pieces of evidence are offered that help examine the effectiveness of this system in more depth.

Hsai (2001) compares the value of a sample of selected sites auctioned between July 1997 and June 1998 by the court (through foreclosure) with their declared value (the tax base of land value tax). The ratio of the latter to the former ranges between 8.9 and 37.6 percent, with an average figure of 17.37 percent. The ratios for cities (counties) with a larger population and a stronger economic performance are significantly higher than cities (counties) of a smaller size in population and economic outputs. This suggests the effective rate of land value tax for these sample sites may be as low as less than 0.18 percent. This figure may be even lower, given that the auction price is generally less than the market price. Peng et al. (2007) estimate the effective property tax rate in two areas of Taipei. The effective tax rate is estimated by dividing the sum of the land value tax payment and building value tax payment by the sales price of a property. The average effective rates are in the range of 0.0886 and 0.1304 percent; the effective rates are higher in the old area than in the new area. Moreover, the effective tax rates are less than one-fifths of the nominal tax rate. As the land and buildings are separately taxed, value proportions of land and buildings for a property are assumed, so as to derive a weighted nominal tax rate.

Lin (2010) applies the concept of assessment ratio (assessed value divided by sales price of a property) to measure the performance of valuing tax and buildings for taxation purposes. A sample set of 10,191 residential properties sold between 1999 and 2004 in Taipei is examined. A property (land plus building) is normally sold as a whole in the market, so the author sums up the assessed values of land and buildings

accordingly. However, the assessed value of land in this sample is the present land value instead of declared land value. The present land value is the tax base for land value increment tax levied on the transfer of land. In practice, the declared land value of a site is lower than and kept to a certain percentage of its present land value. A site is assigned two assessed values: declared value for levying land value tax, and present value for levying land value increment tax. The average assessment ratio is found to be 57 percent. Lin finds no significant variations of assessment ratios among individual properties. However, the assessment ratios show a descending order of single-family houses (71 percent), low-rise condominiums (60 percent) and high-rise condominiums (48 percent). What's more, the variation of assessment ratios is mainly attributed to the differences in the assessed land value (present value) rather than the assessed building value. Although the present value is used in this study, the constant relationships between the present value and declared land value render the conclusions to remain largely valid. In a related study, Lin and Lin (2008) examine the performance of the land value section system in Taipei. This system has long been criticised for ignoring the heterogeneity between individual parcels within a section. The authors examine two newly developed areas of Taipei City with the employment of the assessment ratio (sum of present land value and present building value to sales price). They find no evidence of ratio variations among properties within a section, but noticeable differences are seen between sections. In addition to land valuation, Lin et al. (2011) look into the estimation of building depreciation in determining the present building value for taxation. The authors estimate, with a data set of 10,596 condominium sales, the annual depreciation rate of residential properties of four or five storeys in Taipei and compare it to the figure used for calculating building tax. As expected, the market-revealed depreciation is not linear, as assumed in the tax code. It is naturally understandable, as far as administration simplicity is concerned. Despite the administrational advantages, the estimated annual depreciation is approximately three times the code-set figure. If the replacement costs are correct, the present building value is over-estimated and so is the payment of building tax.

Contrasting Ideals with Realities

The market for land is a thin one in which the heterogeneity among sites and infrequent transactions have made valuation difficult. In order to overcome this problem, first proposed by Dr. Sun Yat-Sen and later incorporated into legislations, self-assessment of land value has become a feature of Taiwan's split-rate tax system. It was hoped that self-assessment would deter owners from under-assessing their land; the threat of government's legitimate purchase would keep them in line. At the

same time, the self-assessment practice would discourage owners from over-assessing, as the threat of future, heavier annual taxation would loom overhead. Niou ad Tan (1994), however, point out that within Sun's suggested framework, even with perfect information, landowners will not report land value truthfully, and their reported value will be less than the market price. In the case that the government is not aware of the market value, the probability that landowners report truthfully remains close to zero. The present practice with respect to valuing land for land value taxation purposes is summarized as follows. The governments value land first and announce the results (declared value) to the general public. For 1 month the land owners are allowed to report to the government their land values with reference to the declared value. In practice, the majority of land owners choose not to report their value and use 80 percent of the declared land value as the taxable value. One might think that if land or real estate is transacted in a thin market, not only individual owners, but the governments as well, suffer from the information problems. Table 4 provides figures from Kaohsiung City, one of the major cities in southern Taiwan, regarding the number of land parcels whose owners choose to report their value to the city. Owners of only 342 out of 418,606 parcels, merely 0.08 percent, reported their land value, and the remaining owners decided not to report values, and accordingly, they used the 80 percent of declared land value as their taxable value. None of the 342 parcels are associated with a reported value outside the (80-120) percent range, so no penalty of purchasing at a low value or taxing at a high value is applicable. The tax payment of the 326 parcels with a reported value higher than the declared value will be in excess of that if they did not report value. This seems counter-intuitive. Also, tax payments of those parcels with reported values at 80 percent of the declared values remain equal to those with no reported values. No explanation as to the owners' motives is offered, however, in the statistics.

In 1999, most likely due to the complexity and confusion of assessing the same land parcel for different purposes, the Ministry of the Interior notified the land administration departments of cities (counties) to take the following factors into account when determining the declared land values: present land values, previous declared land values (usually 3 years in the past), financial conditions of local governments, social-economic conditions and taxpayers' burdens. The present land value is also assessed by local government and primarily for the purposes of land value increment tax and compensation for expropriation of land. Present land value is used by legislations to reflect the market price of the land. Consequently, local governments are presently not assessing land at the declared land value and present

land value, respectively. Currently, land administration departments in cities (counties) tend to keep the declared land value of a parcel to a certain percentage of its present land value. In 2010, on average, the declared land value is 37 percent of its present land value in Taipei.

Table 4 Land Parcels – Owners Reported Value to Kaohsiung Government in 2010

Number of Total Land Parcels: 418,606		
Not Reported Value: 418,264	Reported	Value:
	342	
	< 80% of declared value	0
	At 80% of declared value	16
	At (80-100)% of declared value	0
	At 100% declared value	313
	At (100-120)% of declared value	13
	>120% declared value	0

Source: Department of Land Administration, Kaohsiung City

With respect to the tax base of buildings, the assessed present building value is also argued to deviate materially from the market value. Taking Taipei as an example, the table of replacement costs for buildings of 36 storeys or more was revised in 2005, but the one for buildings of 35 storeys or under and the one for basements have not been revised since 1981. It is widely believed the market value of buildings is five to six times the assessed present building value. It is also worth reiterating that the land parcels are assessed by land administration departments, but the buildings are assessed by revenue service departments. What concerns land administration departments most is the land portion of a property value, while revenue service departments are primarily concerned with building costs and depreciation, and they pay no attention to land value. Additionally, two expert committees are respectively responsible to oversee valuation of land and buildings. A small number of experts are a part of both committees and no communication between them is required. However, their decisions collectively decide the tax base, and consequently, the payment of property tax, that is, the sum of land value tax and building tax.

Despite the seemingly strict tax rate structure on land, to what extent this structure functions hinges on two factors: the proportion of land to which a preferential rate is applied, and the proportion of land placed across different brackets. Once again, as we lack the detailed figures for all of Taiwan, we take Taipei as an example. Table 5 provides statistics to answer the above questions. In terms of the size of a land parcel, the preferential rate is applied to over 40 percent of the private land. For those subject to banded rates, around 34 percent of the land parcels are taxed at the base rate of 1 percent, and additional 9 percent are taxed at 1.5 percent, and around 5-6 percent of them reaches the top bracket of the 5.5 percent tax rate. It is not clear by this table alone whether the relatively low percentage of land placed in the higher

brackets is the desired results of this rate structure, or if it is simply because the threshold is so high that not many land owners are liable for a higher rate. The latest threshold value in 2010 for Taipei City is 29,510,000, equivalent to USD 921,890. By any reasonable measure, fairly few "ordinary" property owners will have a parcel worth this much. That is to say, except for a small number of individuals and corporations, ordinary land owners would either pay a preferential 0.2 percent or a base 1 percent for their land. Moreover, the lowest 1.2 percent owner-occupied building tax also applies to the majority of residential buildings. It is not difficult to reach the conclusion given Taiwan's currently high 88 percent home ownership rate (Hua 2010).

Table 5 Distribution of Tax Rates Applied to Private Land

Area unit: hectare

Figure: in N.T.$1,000

Years	**2005**		**2006**		**2007**		**2008**		**2009**	
Classifications	Areas	Percentage	Areas	Percentage	Areas	Percentage	Areas	Percentage	Areas	Percentage
Sites of Owner-occupation	1,869	41.6%	1,900	42.0%	1,923	42.2%	1,953	42.7%	1,983	43.5%
Ordinary Land	2,447	54.5%	2,441	54.0%	2,439	53.6%	2,415	52.8%	2,364	51.9%
Basic Rate	1,571	35.0%	1,569	34.7%	1,565	34.4%	1,558	34.1%	1,540	33.8%
Bracket I	429	9.5%	428	9.5%	424	9.3%	425	9.3%	413	9.1%
Bracket II	99	2.2%	106	2.3%	106	2.3%	108	2.4%	102	2.2%
Bracket III	47	1.0%	50	1.1%	51	1.1%	45	1.0%	44	1.0%
Bracket IX	27	0.6%	25	0.5%	32	0.7%	27	0.6%	22	0.5%
Bracket X	274	6.1%	264	5.8%	261	5.7%	251	5.5%	243	5.3%
Others	177	3.9%	183	4.1%	191	4.2%	203	4.4%	208	4.6%
Total	4,493	100.0%	4,525	100.0%	4,553	100.0%	4,572	100.0%	4,555	100.0%

Source: adapted from statistics of Taipei tax revenue

Taking account of the property tax structure and the distribution of land parcels across tax brackets, it is fair to say that for the majority of owners of residential properties, land is taxed at a lower rate than that applied to buildings and likely by several times if the 0.2 percent preferential rate is applicable.

A valuation dispute is required by law to be heard by the expert committee prior to being sent to the administration courts. Chen (2008) finds that the courts tend to pay a high deference to the decisions made by the committee. The courts only examine the disputes from a legal perspective, and pay very little attention to the valuation. Because the expert committee only meets a few times a year, the lack of time and

information have led the approved valuation results to be frequently questioned. In a public choice context, the governments seem to have taken advantage of this dispute resolution design. The expert committee has become a cost-effective mechanism to stop the majority of disputes from going further to the administration courts and to strengthen governments' position in the courts (Lin and Chen 2010).

What the Current Split-rate Property Tax Leaves Us

A number of features are widely acknowledged as embedded in a standard split-rate property tax; frequent assessment of land, and a higher rate on land than on buildings, among others. Various mechanisms are often designed to facilitate the functioning of this split-rate system.

One characteristic of Dr. Sun's original land value taxation design is the self-assessment of land by owners. The fairly low percentages of owners who report their own assessments have proved that this design is rarely functional in practice. In addition, the governments have for many years not undertaken specific assessment for declared land value, and instead, kept it largely to a certain proportion of assessed present land value. As a consequence, the declared land value is gradually losing its unique position in making land policy.

When present land value is determined, the land is assumed to be in the highest and best use, irrespective of its real use. The frequent revaluation of land is supposed to provide a tax incentive to utilise land to its fullest potential. In a city like Taipei, where the highest and best use of land is constantly changing, the value of a vacant site is found to demand a price higher than a developed site with similar attributes (Lin and Jhen 2009). Also, land revaluation is costly. Taiwan has developed land value sections to lessen the costs involved. Despite the advantages of saving time and costs, land value sections are often criticized for insufficient attention paid to the differences among individual sites. However, this criticism has found no concrete supporting evidence.

Respective values of land and buildings need to be extracted from a property in the context of split-rate property tax. Land is viewed as a residual element after a depreciated building value is deducted from the property value. However, this practice fails to take account of the prevalence of partial ownerships on a site. Taiwan's residences are dominated by high-rise buildings. The site of a high-rise building is typically collectively owned by individuals of all housing units. Nevertheless, the value of a site as a whole is derived from deducting the

depreciated replacement costs of the whole high-rise building from the estimated market value of the whole property (site plus building). In other words, the site is assumed to be of sole ownership when valuing it. This practice ignores the costs of land assembly, and assumes the value of a site of 200m^2 to be equivalent to the sum of 10 sites of 20m^2 each. This assumption simply deviates too much from reality. The price effects of site size in a city are well documented in Lin and Evans (2000) and Colwell and Munneke (1999). The extent to which the assessed value will be skewed depends on the significance of land assembly.

In the framework of split-rates combined with a banded progressive rate on land, land is supposed to be taxed heavier than buildings. The majority of land, however, falls into the preferential rate category of 0.2 percent or the basic 1 percent rate, and at the same time, the majority of residential buildings are eligible for owner-occupied preferential rate of 1.2 percent. In consequence, a significant proportion of owners of residential properties pay a higher tax for buildings than for land. In addition, the property tax rate, with land and buildings combined, is expected to be in the range of between 0.2 or 1 percent (on land) and 1.2 percent (on buildings) for residential properties. The magnitude of this weighted tax rate also depends on the respective percentages of the land value and building value of a property. Lin and Jhen (2009) find that land takes on an average of 75 percent of the total property price in Taipei. This high proportion of land element in property value will further skew the weighted rate downwards. Also, the weighted tax will favour properties such as single-family houses with a low floor-to-land ratio or older houses pending demolition with a value that is exclusively attributed to land (Dye and McMillen 2007). On top of that, the tax base is found to be materially below the market value; therefore, the effective rate of the property tax is significantly lower than its nominal rate. The nominal rates are set by the central government and are difficult to change. In response, city or county governments take their discretion in deciding the tax base through the valuation process.

Putting all these observations together, how has this split-rate tax system evolved from its original form? I would argue that the significant, though not always explicit, changes are in regard to the tax base; that is, the valuation practice of land and buildings. Declared land value is now indexed, although only implicitly stated, to the present land value. In this regard, the importance of land value tax in performing policy functions is weakening, and primarily seen as a steady local tax revenue. Besides, the expedient of a land value section to a large extent solves the problem of the sparse sales of vacant land, and also facilitates the frequent revaluation given the

limited manpower. Despite having been continuously criticised, the valuation section is unlikely to be replaced. The partition of land and building values will remain a challenge, in particular for high-rise buildings with many joint owners on the site. The preferential rates for land and buildings, in conjunction with the application of lower rates to the majority of land, incentivise ownership, but also lessen the strength of the split-rates in intensifying land use. Finally, decisions of expert committees have been increasingly confronted with disputes in the court. The land administration departments must soon establish a more transparent and accountable mechanism to defend their valuation results.

References

Appraisal Institute (2008) The Appraisal of Real Estate. Chicago: Appraisal Institute.

Chen, Min-Chan (2008) Compensation for Private Land Expropriated for Public Facilities. Yue-Dan Financial-Economic Law Journal. 14: 115-150 (in Chinese)

Cohen, Jeffrey and Coughlin, Cletus (2005) An Introduction to Two-Rate Taxation of Land and Buildings. Federal Reserve Bank of St. Louis Review. May/June.

Colwell, Peter and Munneke, Henry (1999) Land Prices and Land Assembly in the CBD. Journal of Real Estate Finance and Economics. 18(2): 163-180.

Dye, Richard and McMillen, Daniel (2007) Teardowns and Land Values in the Chicago Metropolitan Area. Journal of Urban Economics 61: 45-63.

Dye, Richard and England, Richard (2010) Assessing the Theory and Practice of Land Value Taxation. Cambridge: Lincoln Institute of Land Policy.

Hua, Chang-I (2010) Home Ownership is Misleading. Taipei Times. April 14 2010.

Lin, Tzu-Chin and Evans, Alan W. (2000) The Relationship between the Price of Land and Size of Plot When Plots are Small. Land Economics. 76(3): 386-94.

Lin, Tzu-Chin and Lin, Tzu-Ya (2008) Evaluating the Performance of Property Assessment in the Public Sector: An Equity Perspective. Journal of Housing Studies. 17(2): 63-80. (in Chinese)

Lin, Tzu-Chin and Jhen, Min-Hua (2009) Inequity of Land Valuation in the Highly Developed City of Taipei, Taiwan. Land Use Policy. 26(3): 662-668.

Lin, Tzu-Chin (2010) Property Tax Inequity Resulting from Inaccurate Assessment- The Taiwan Experience. Land Use Policy. 27(2): 511-517.

Lin, Tzu-Chin, Lee, Wang-In and Chen, Go-Hwa (2011) Estimation of Depreciation of Condominium Buildings and its Implications on Tax Burdens on Buildings. City and Planning. 38(1): 31-46. (in Chinese)

Lin, Tzu-Chin and Chen, I-Gin (2010) The Expropriation of Private Property- The

Perspective of Valuation. Working Paper. Department of Land Economics, National Chengchi University. (in Chinese)

Lusht, Kneenth. (2001) Real Estate Valuation: Principles and Applications. KML Publishing.

Niou, Emerson and Tan, Guofu (1994) An Analysis of Dr. Sun Yat-sen's Self-assessment for Land Taxation. Public Choice. 78: 103-114.

Peng, Chien-Wen, Wu, Sun-Tien and Wu, Shyang-Hua (2007) The Influences of Effective Property Tax Rates on Housing Values: Evidence from Ta-tung and Nei-hu Districts in Taipei City. Journal of Taiwan Land Research. 10(2): 49-66. (in Chinese)

Schwab, Robert and Harris, Amy (1998) Taxing Simply, Taxing Fairly. Full Report to District of Columbia Tax Revision Commission.

Tsai, Chi-Yuan (2001) Land Taxes in Taiwan: Problems, Impact and Reforms. Journal of Taiwan Land Research. 3: 37-83. (in Chinese)

Yan, Zhang-Fu (2005) Land Taxation. Taipei: Wu-Nan Publisher. (in Chinese)

Yu, Zong-Xian and Wang, Jin-Li (2005) Evolution of Taiwan Tax Systems. Taipei: Lian-Gin Publisher. (in Chinese)

Land Recycling, Urban Regeneration and City Growth in a Booming Market- The Taipei Experience

Abstract

To tear down or put up a building is not only an engineering matter, it involves also economic considerations, among others. Moreover, pressure on land (re)development could be substantial in a city where housing price has skyrocketed. Physical fabrics play a critical role in a city's competitiveness but are constantly ignored in theories. An inert response of housing supply to economic needs is argued to likely contribute to an elevated housing price and subsequently wide-ranging adverse effects. Taipei has indeed in recent years seen an escalating housing price, and a number of unfavourable phenomena seem to have met the dismal prediction. The present study sets out to understand how new floor spaces have been supplied and its implications when the housing price in this city has been on a significant and alarming rise. We first examine in depth the official records of building demolition and construction in the hope to understand how the housing market has acted to the price signals. It is concluded that, first, the supply of building spaces does not seem to be able to lessen the escalating housing price. In addition, not only those old neighborhoods with aged buildings but also the pricey neighborhoods have observed most activities of teardowns. Third, buildings made of concrete tend to be replaced significantly earlier than its end of physical life. In contrast, a notable proportion of brick and wood buildings stand longer than their physical life. Fourth, a substantial number of new spaces are supplied on the raw land of the outer areas. But few new spaces are supplied to the deteriorating areas where redevelopment is in urgent need. Fifth, no favourable prospect of labour or housing rental market is in a near sight, and therefore a timely and significant amount of new housing supply have become essential for Taipei's continuing leading edge. Finally, with the shrinking population islandwide including Taipei, the lack of incentive to redevelop deteriorating old neighborhoods might lead to a further decline of the inner city and financial difficulties with providing public facilities there. Furthermore, we look into the policy effects of urban regeneration in Taipei. It is found that regeneration policy has brought new spaces primarily into peripheral districts where redevelopment pressure is least intense, and this policy does not supply as much space as it intended into the old core districts where buildings are aged and land assembly difficult. In addition, developers are most interested in the expensive central districts where the market would be most likely to supply new spaces even without regeneration scheme.

Keywords: housing supply; land (re)development; urban regeneration teardowns

Land Supply and Urban Development

A city is often presented as an agglomeration of people and firms where trade and production occur. In order for trade and production to take place, physical structures are required. The expansion of such economic activities, that is, urban growth, naturally calls for more supply of floor spaces. In the conventional model such as that proposed by Alonso (1960), land is assumed to be always used for the activity paying the highest rent at every point in time. The supply of land is highly elastic and landowners or landlords have no incentive to keep their land off from the market, not even for a fairly short period of time. However, this prediction is in stark contrast with the reality. Evans (1983) suggests the land supply to be upwardly sloping because of the attachment owners might enjoy from ownership. Due to the various psychological benefits or economic surplus, owners of sites with similar attributes will neither supply their land at the same price nor the same time. In addition, the anticipation of future changes in the market conditions will affect the supply of land and its price in the present period. Neutze (1987) regards the value of a land parcel is the sum of the present value of the income flow from the current (lower) use up to the time of the change in land use, and that of the higher income flow thereafter. In order to maximizeit the land value, it is sometimes for landowners worth holding land in a use with a lower income flow so as to keep the opportunity of converting use of land to another with a higher income flow. Shoup's study (1970) on the optimal timing of urban land development comes to similar conclusions. He suggests that delaying the development of a site to a later date may result in a different and usually more capital-intensive form of development, justifying a higher payment for the land. In general, the timing for (re)development of urban land hinges on the return of alternative investment, proeprty tax, earnings in interim uses, and return of the future higher use, among others. Particularly important, he suggests that an owner keeping his land in a lower density use for some periods may serve the function of preventing it from a premature form of development. That is to say, land is possible to remian in a lower density use even in the absence of unertainty about the future. In respect of the market uncertainty, Titman (1985) likens ownership of a parcel of vacant land to that of a stick option. Development of a site is equivalent to exercise of an option. He demonstartes that a higher (lower) level of uncertainty will lead to a higher (lower) value of vacant land relative to developed land, which consequently contributes to a smaller (larger) amount of land for development.

In a city where housing supply is elastic, when the city grows, the increase in demand is expected to bring forwards new supply of housing and more population, thus the corresponding increase in housing prices would be modest. The additional labour

supply made possible through creation of new hosuing helps ensure that more demand on labour will not lead to a significant increase in wages. In comparison, in a city where housing supply is inelastic, when the city grows, impact will not be reflected on new construction or its population, but on housing price. Furthermore, not only will the price of houses rise, but also the wage in that the workers have to be compensated for the higher housing price. Some firms will therefore leave for places with a lower wage. People who afford to continue living in this city tend to be those with a higher wage and better skills. Younger people and talented outsiders will be priced out of the city. The consequent concentration of a small elite group might not immediately harm the city's economic vitality, but will be likely to damage its future. Alongside with the above line of arguments, Glaeser (2006) and Glaeser et al. (2006) highlight a number of adverse economic and social consequences when housing supply cannot keep pace with urban growth; including worsening housing affordability, declining urban population, greater volatility of housing price, shrinking employment and income, and less diversified demographic mix.

The inflexibility of housing supply could be resulting from a legal restriction imposed by the city or the natural scarcity of land. In the former case, the new supply can come forward through the relaxation of restriction. In contrast, for a city with a scanty supply of land and no place to expand, redevelopment of built-up sites at a higher density will be a most sensible policy. To tear down a building is not only an engineering matter, it involves also economic considerations. Barlev and May (1976) reason that buildings will be torn down when there are financial incentives to redevelop a site. They, through a case study of New York City, find that a heavier property tax, and a higher income level will hasten building demolition. In contrast, a higher interest rate, a larger building stock, a higher construction cost will prolong the time a building has stood. Weber et al. (2006) employ the logit model to investigate the determinants of tearing down a building. They suggest that aged buildings tend to suffer from functional obsolescence. A building inflicted with incurable functional obsolescence is likely to be torn down earlier than others. The degree of building depreciation therefore represents the likelihood that a building will be torn down. Empirical evidence suggests a higher age, a lower floor-to-land ratio, a better access to public transportation and Chicago Lake will raise the possibility of a building to be knocked down sooner. Dye and McMillen (2007) also examines the Chicago metropolitan areas, and find the followings factors to be positively associated with the occurrence of building teardowns: better access to rapid transit line and Lake Michigan, a larger lot site, a higher floor-to-land ratio, among others. They also find the price of those properties that were demolished

soon after their sales is irrelevant to building attributes (building materials, design style…). The price paid for those soon-to-be-demolished properties is for the land only.

These studies clearly suggest that demolition of a building, in particular in a major city, is largely an economic phenomenon. The possibility of a building to be torn down is not uniform across neighborhoods, and can reasonably be explained by a number of economic and social parameters. In addition, the teardowns possibility is associated with the expected value of a new property on a redeveloped site, especially in a city with scarcity of land. Moreover, pressure of land redevelopment is great in a city where demand significantly outstrips supply. In consequence, buildings in such a city are prone to be knocked down far ahead of the time when they are physically obsolete. In other words, the economic life of a building is shorter than its physical life. The timing of a building to be torn down is primarily explained by three groups of factors: the characteristics of building itself (materials, design…), accessibility to transport nodes and amenity (rapid transit line, lake…), as well as socio-economic conditions (income, land use zoning…).

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Supply of New Spaces over Time

Taipei at the end of year 2009 has 2,607,428 inhabitants over the area of 271.8 km^2, leading to a density of 9,593 inhabitants per km^2. Despite the slight decline in population of the city in recent years, the number of household has been on a steady rise. Mountains and rivers surrounding Taipei are on the other hand topographical constraints for this city to grow. The steadily rising demand for and limited supply of land put together have created a framework in wihch developers seek to find sites for new development. It is obligatory in Taiwan to apply for a permit to demolish or construct a building. Therefore, the official record of building demolition and construction provides a reliable source. Through years 2001 to 2010, the housing price in Taipei has more than doubled, but the accompanying additional floor spaces have not kept up with the soaring price. In the meanwhile, the new households continue to form up to the present. (see Table 1) Chang et al. (2009) detect an apparent price bubble in Taipei housing market. The housing price has been overvalued by 38% and 27% compared to price/income and price/rent ratio derived fundamental prices, respectively. These phenomena suggest an inelastic housing supply in the city, and a dominant economic driver this city has played.

Table 1 Housing price, new floor spaces, and household units over time

Years	Sin-Yi Housing price index (Q4)	New Floor Space as % of total stock	Household Units
2001	105.93	2.12%	894,763
2002	107.91	2.11%	906,988

2003	115.95	1.91%	914,716
2004	132.08	1.94%	923,325
2005	145.45	1.57%	933,110
2006	166.64	1.46%	941,317
2007	181.53	1.67%	947,745
2008	182.47	1.93%	958,433
2009	220.03		969,418

Source: Sin-Yi Realty http://www.sinyi.com.tw/news/news-estate.aspx and Taipei City Statistics Department

These statistical evidence as a whole fit well into the arguments put forward in Glaeser (2006) and Glaeser et al. (2006). If their predictions are largely correct, Taipei will be soon, or maybe already is, suffering from the adverse consequences of an inelastic housing supply. One natural possible way to rectify the inelasticity problem is to bring forwards more new housing units into the market, either through urban expansion or redevelopment.

This piece of work does not attempt to address in details whether Taipei has exhibited the inelasticity symptoms. We rather are convinced that it has. Our task instead is to examine how the market has responded. We particularly take a spatial perspective to study the activities of tearing down old buildings and erecting new ones. We hope to find the geographical and associated patterns of these activities in Taipei where land supply is strictly limited, and to the extent possible point out the likely impacts of these patterns on Taipei's future growth.

Table 2 provides details on the net additions of building spaces, new spaces less torn-down spaces, from 2001 through 2009 across individual districts. Despite the housing price has risen during this period of time by 107.7%, the building spaces only has increased by 21.2%. The sharp contrast highlights the inert response of building supply to housing price. In addition, it is noted that Neihu leads by a substantial margin other districts in supplying additional spaces. Neihu is an area on the east of Taipei where many new developments have been happening. In contrast, Datong and Wanhua, on the west part of the city, are early-developed areas where buildings are overall much older than other parts of the city. However, these two old districts have seen the smallest shares of additional supply of spaces. The additional building spaces distribute in an unequal way.

Table 2 Annual net additions of building spaces across districts

Districts	2001	2002	2003	2004	2005	2006	2007	2008	20
Shilin	225192	272353	129102	143561	199188	103965	259965	316322	
Datong	116372	62403	48914	15778	66762	97641	104152	40537	
Daan	165162	101921	168568	231425	267575	204692	120747	342851	
Zhongshan	244429	262894	438440	491107	515191	180316	439841	272155	
Zhongzheng	148163	153476	125701	142936	115183	153347	138457	329072	
Neihu	945213	919077	519591	461678	555002	426941	602005	842076	
Wenshan	148034	147995	203026	81166	161024	177254	269088	217115	
Beitou	186667	165314	157035	224323	179424	218236	262412	298006	
Songshan	326765	371606	71966	231197	98666	145373	78502	37195	
Xinyi	178048	239942	416174	297076	130050	203504	233034	88547	
Nangang	63679	107096	244930	271094	38585	253427	111529	379532	
Wanhua	39187	111425	55330	107379	41057	43654	88177	94550	
Total	2786917	2915507	2578783	2698727	2367712	2208356	2707914	3257965	33

We further disaggregate the distribution of net building spaces into smaller spatial units (see Figure 1). On a visual inspection, building supply seems to exhibit a clustering pattern. The additional building spaces tend to occur in some specific areas. Generally speaking, the majority of them appear in the outer parts of the city, but some sporadic units with a higher level of net space supply are observed in the old city areas.

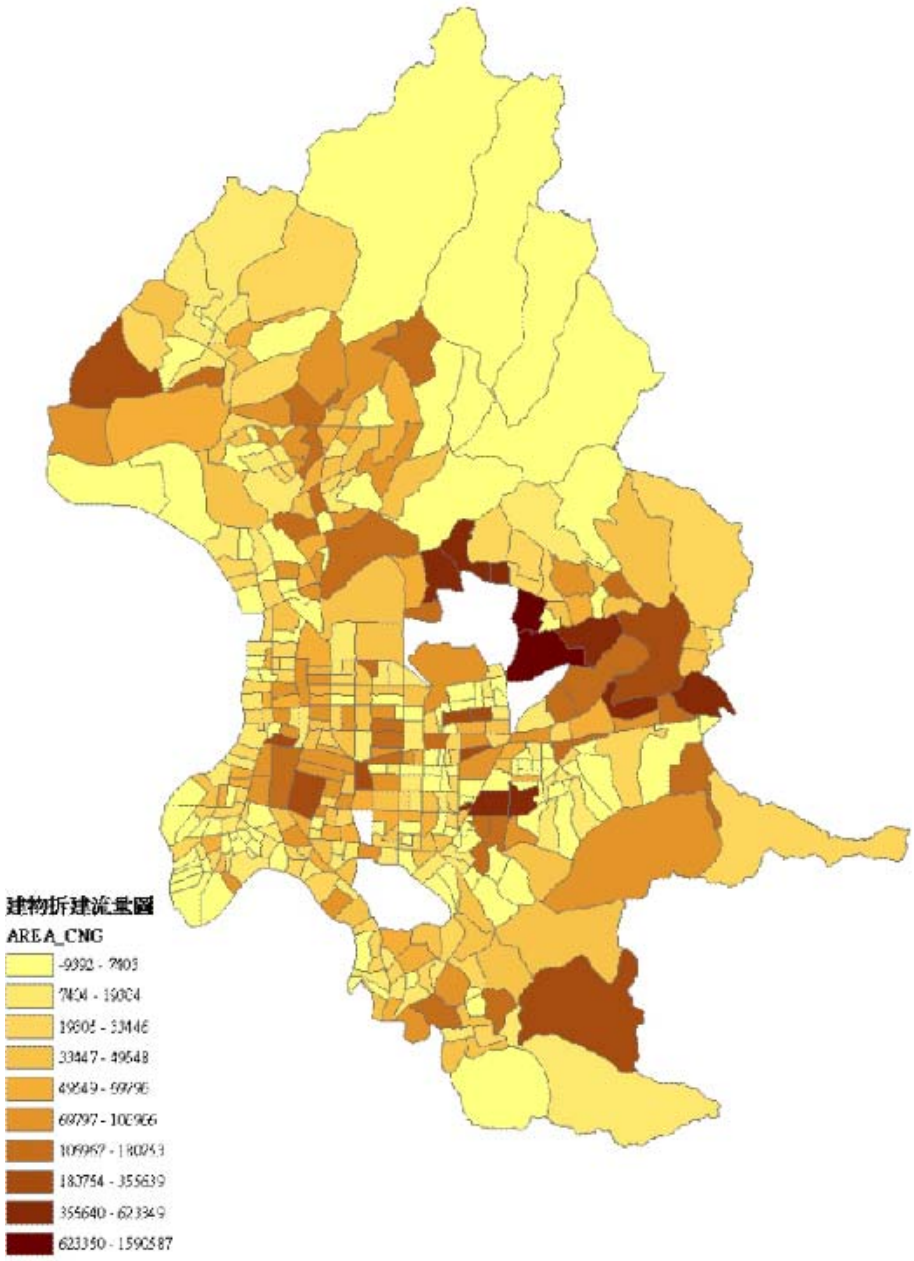


Figure 1 New additions of building spaces over locations

Economic Life of Buildings and Land Recycling

Figure 2 indicates the location of demolished buildings over the study years. Table 3 also provides statistics of the demolished floor areas and its share of the whole stock for respective materials of buildings. Despite it is difficult to conclude if a demolition rate is desirable. Wooden and brick buildings are with little doubt to be judged as under-developed and expected to be replaced by high-rise buildings. The figures in Table 3, however, suggest that more than 200 years will be needed for all the wooden and brick buildings to disappear. It is believed that the legal, such as complex

multi-ownership, and not economic obstacles have contributed to the delayed demolition. This will lead to an inefficient land use for sites are not allocated for a more economically productive purpose.

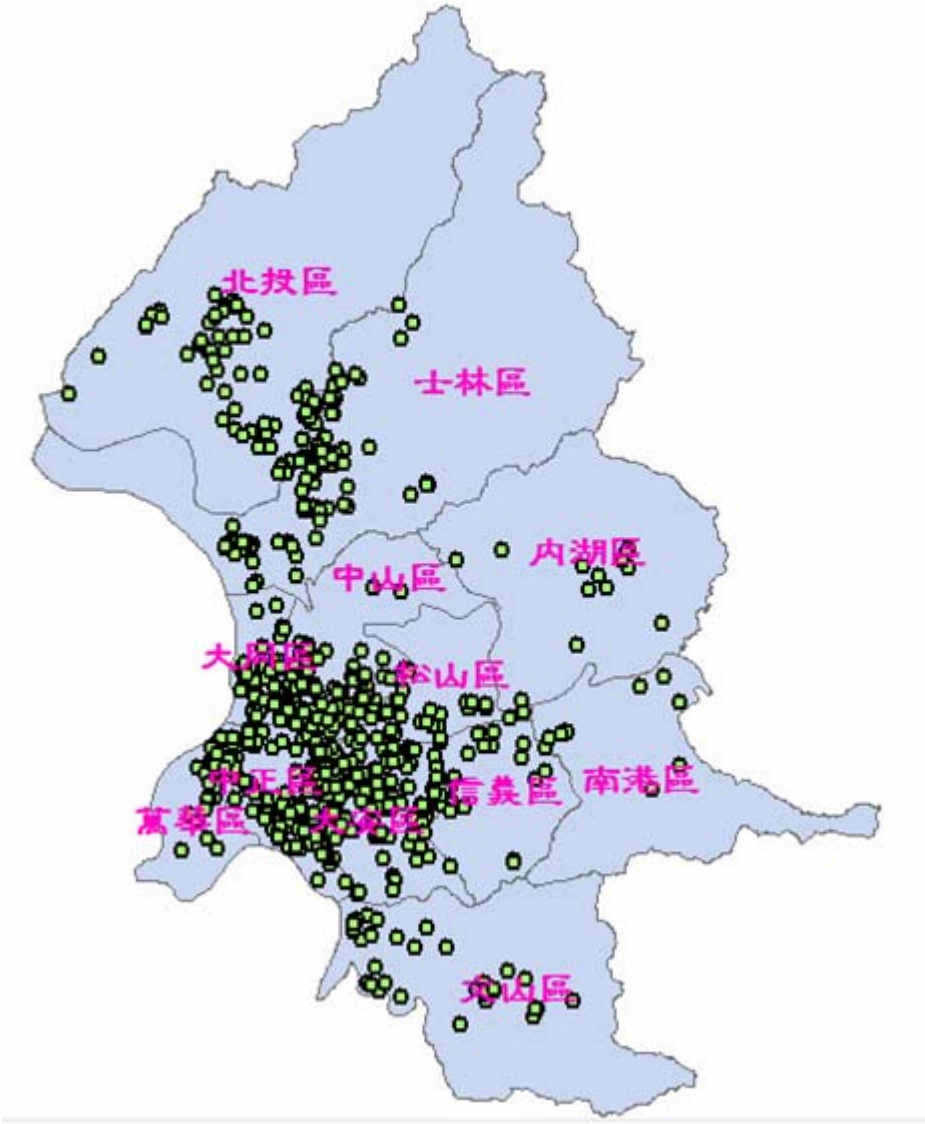


Figure 2: Location of Demolished Buildings

Table 3: Floor-areas (m^2) of demolished buildings and the percentage in its stock (2001.1-2008) by materials over time

	2001	2002	2003	2004	2005	2006	2007	2008	Total
Concrete	5222	20121	42354	53610	64786	75155	73721	86673	421642
	0.01%	0.02%	0.04%	0.05%	0.05%	0.06%	0.06%	0.07%	0.04%

Reinforced-brick	18577	10765	24132	33462	56797	24233	54025	52944	274935
	0.15%	0.08%	0.19%	0.26%	0.44%	0.19%	0.42%	0.41%	0.27%
Brick	1982	5523	8520	8453	11702	13852	38961	17825	106818
	0.08%	0.23%	0.35%	0.35%	0.49%	0.57%	1.61%	0.72%	0.55%
Wood	3641	7431	3940	2138	3276	2879	3812	3726	30843
	0.45%	0.92%	0.49%	0.27%	0.42%	0.41%	0.58%	0.55%	0.51%
Total	29422	43840	78946	97663	136561	116119	170519	161168	834238

We further select the 692 buildings with information of their age when knocked down. The distributions of building ages for respective materials are shown in Table 4. The age of the majority of buildings torn down ranges between 26 to 45, significantly ahead of their physical durable ages. Approximately one-fifth of the buildings were even knocked down before they have reached 25 years. In contrast to the law-specified building physical life for purpose of property taxation (see Table 5), it is noted that all demolished concrete buildings were knocked down before they reached their physical life. As high as 40% of demolished concrete buildings even did not reach half of their physical life. A small percentage of reinforced-brick buildings were over 52 years when torn down. In contrast, a relatively larger percentage of brick and wood buildings survive their physical life. Due to data constraints, we, however, are not aware if there are and how many buildings have outlived their physical life and remain in use.

Table 4: Distribution of building ages when demolished

Year	<5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Total
Concrete	8	2	3	19	33	43	69	52	30	13	1	0	273
Reinforced-Brick	6	2	0	1	5	18	32	96	88	63	18	1	330
Brick	1	1	0	2	8	10	2	18	16	11	3	0	72
Wood	1	0	0	1	2	6	2	1	2	2	0	0	17
Total	16	5	3	23	48	77	105	167	136	89	22	1	692

Table 5: Law-specified annual depreciation, physical life and salvage value

Structure materials	Annual depreciation (%)	Physical life (years)	Salvage value (%)
Reinforced concrete	1%	60	40%
Reinforced brick	1.2%	52	37.6%
Brick	1.4%	46	35.6%
Wood	2%	35	30%

Even though it is necessary for buildings to be knocked down for future development, a too-early demolition also represents waste of resources and disjoint between urban plan and market reality. It also raises curiosity that a respective 19% and 29% of brick and wooden buildings had passed their physical life when torn down. It is practically easy and economically sound to knock down such low-density buildings to accommodate expanding population and activities. But the figures suggest that redevelopment did not move as smoothly as normally expected. A delayed redevelopment on those desirable sites displays another policy puzzle to be explored.

As suggested earlier, Taipei is short of land but pressure from demand has kept mounting evidenced by the escalating housing price. Outstrip of demand over supply naturally calls for redevelopment of built-up sites. Table 6 looks into the teardown-building up or land recycling phenomenon. Within our expectation, Neihu has registered the largest number of new development projects primarily on raw land (merely 4.04% of projects are on previously developed sites). The number of new development projects in Daan is in the third place, and as high as 88.15% of them were built on previously developed sites. Neihu is on the east outwards of the city and with a large stock of raw land primarily supplied through public schemes of land readjustment. In contrast, Daan was developed much earlier and has been the most expensive areas, and recycled sites provide the major sources of land for new development. For those development projects that were built on the redeveloped sites, the average time span between teardown and construction ranges between 2.5 and 3.5 years. This figure suggests that a new building would soon be erected after an old one was torn down. In a city where housing price is high, the developers

cannot afford leaving a site idle for too long.

Table 6 Building teardowns and construction over years of 2001-2009

Districts	Accumulated new development projects (A)	Redevelopment on the same sites (B)	Projects built on the same sites (B/A) in percentage	Average years between knockdowns and development
Shilin	422	105	24.88	2.74
Datong	223	60	26.91	2.72
Daan	464	409	88.15	3.12
Zhongshan	471	108	22.93	2.55
Zhongzheng	329	137	41.64	3.07
Neihu	742	30	4.04	2.63
Wenshan	366	21	5.74	2.55
Beitou	386	58	15.03	2.77
Songshan	167	23	13.77	2.74
Xinyi	183	18	9.84	2.46
Nangang	179	20	11.17	2.71
Wanhua	136	31	22.79	3.48
Total/average	4068	1020	23.91	2.8

Urban Regeneration as a Policy stimulus

These statistical evidence as a whole fit well into the arguments put forward in Glaeser (2006) and Glaeser et al. (2006). If their predictions are largely correct, Taipei will be soon, or maybe already is, suffering from the adverse consequences of an insufficient supply of housing. Another piece of evidence that demonstrates the lag of supply behind demand is the relatively low age of buildings when they are torn down. Lin (2011) finds the average age of demolished buildings in Taipei was around 30 years, far below their physical durable age. As Taipei is as a whole a fully developed city, buildings are knocked down primarily to give way for new development of taller buildings. In the context of a pressure on redevelopment to supply new and more housing spaces, approximately 26% of present buildings are ready to be replaced (Table 7) in that they are over 30 years.

Table 7 Distribution of Building Ages in Taipei City

Age	Household	%	Floor space(m2)
<1	4,635	0.5	435,227
2~5	51,217	6.0	4,809,276
6~10	66,549	7.8	6,248,951
11~15	55,315	6.5	5,194,079
16~20	106,483	12.5	9,998,754
21~25	175,243	20.5	16,455,318
26~30	173,835	20.3	16,323,107
31~35	113,230	13.2	10,632,297
36~40	62,598	7.3	5,877,952
41~45	22,481	2.6	2,110,966
46~50	8,770	1.0	823,503
>50	14,626	1.7	1,373,381
Total	854,982	100.0	80,282,810

Article 1 of Urban Regeneration Act states, “This Act is enacted to promote a well-planned urban land redevelopment, revitalize urban functions, improve urban living environments, and to increase public interest.” Although urban regeneration can be undertaken through reconstruction (demolition followed by rebuildings), remodeling or maintenance of buildings (Article 4), most regeneration projects are undertaken through reconstruction. Naturally, districts developed early and with more aged buildings are susceptible to be included in regeneration projects. The 12

districts of Taipei City can be divided into three categories in light of its development history; old core (developed earliest by the river), centre (developed later), and periphery (the outskirts and less densely inhabited).

The urban regeneration areas are designated by Taipei government, thus indicates its preference over regeneration location. Also, the designated regeneration areas are a broader area within which the boundary of a regeneration project needs to be further specified. As expected, the figures in Table 8 shows designated regeneration areas located in old core districts accounts for 40.4% of the total areas (in terms of number). These figures indicate the government's strong intent to renew the old core areas.

Table 8 Designated Urban Regeneration Areas over Districts

Districts		Designated areas NO.	percentage
Old core	Datong	27	35.8%
	Wanhua	25	
	Zhongzheng	25	
Centre	Zhongshan	22	33.5%
	Songshan	12	
	Xinyi	17	
	Daan	21	
Periphery	Wenshan	21	30.7%
	Neihu	10	
	Nangang	10	
	Shilin	15	
	Beitou	10	
Total		215	100%

Although Taipei government has indicated its preference over the location of regeneration areas, it is not the government but the developers who are undertaking the projects. The developers are allowed to apply for a regeneration project inside out outside the regeneration areas. If the applied projects are located within the government pre-specified regeneration areas, the procedure will be simpler, time spent shorter and chance of being approved higher. If the applied projects are outside the pre-specified regeneration areas, the application is expected to take longer. The locations for a regeneration project favourable to developers will be

revealed from the locations of regeneration projects applied to the government. Table 9 clearly shows that central districts are most favoured by developers, followed by peripheral districts and finally the districts in the old core. The sharp contrast between Table 8 and Table 9 clearly shows the different preference between government and developers as to locations for regeneration projects.

Table 9 Urban Regeneration Projects Applied (years 2001 to 2010)

Districts		Projects applied	Percentage	Parcels	percentage	Areas	percentage
Old core	Datong	15	19.7%	472	17.2%	40882.3	17.4%
	Wanhua	12		510		29105	
	Zhongzheng	49		1316		111551	
Centre	Zhongshan	57	54.3%	1122	41.1%	134009.13	52.2%
	Songshan	30		1741		107848	
	Xinyi	41		1249		124654	
	Daan	81		1362		177865	
Periphery	Wenshan	21	26.0%	482	41.7%	62064.75	30.3%
	Neihu	14		370		56394	
	Nangang	14		3565		51472	
	Shilin	32		674		94356.63	
	Beitou	19		463		51945	
Total		385	100%	13326	100%	1042146.81	100%

Taipei government will examine every application project and based on its plan and preliminary study to decide on if to give a go-ahead. Table 10 provides the statistics of applications that are later approved. Only when a project is approved will it later supply new spaces to the district it is located. Over 44% of approved projects occur in peripheral districts, followed by central districts, and finally the old-core districts.

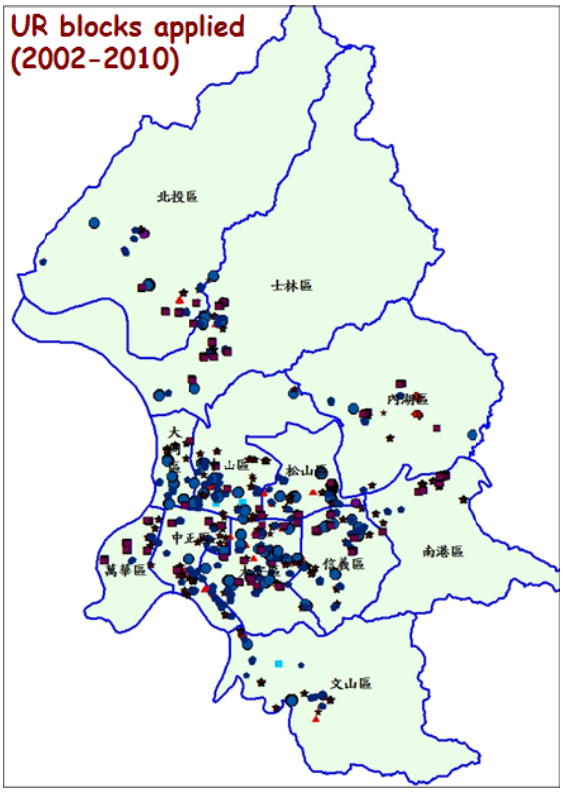
Table 10 Urban Regeneration Projects Approved (years 2001 to 2010)

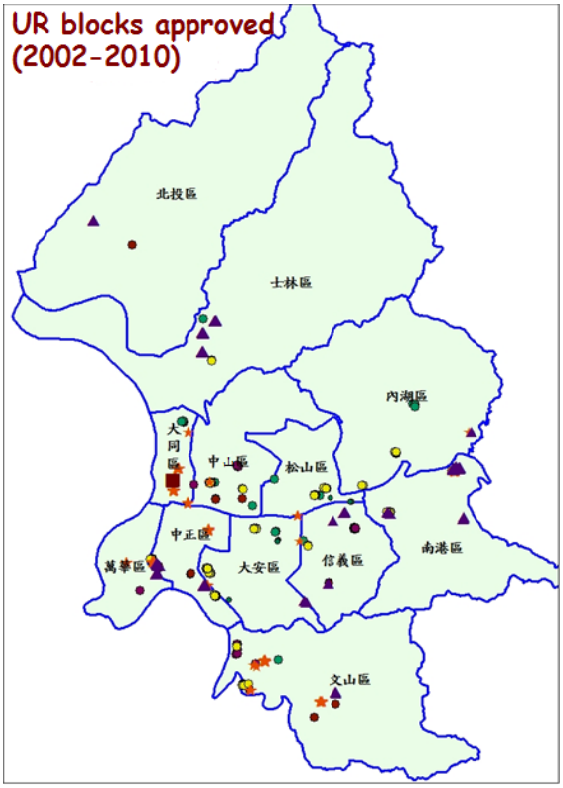
Districts		No. approved	Percentage	Parcels	percentage	Areas	percentage
Old core	Datong	7	22.2%	634	32.9%	175468	38.9%
	Wanhua	2		361		30100	
	Zhongzheng	7		1040		98687	
Centre	Zhongshan	8	40.3%	1367	35.9%	45604	17.9%

	Songshan	6		121		17536	
	Xinyi	9		602		56862	
	Daan	6		128		20449	
Periphery	Wenshan	10	37.5%	1182	31.2%	114373	43.2%
	Neihu	5		339		120358	
	Nangang	6		298		65526	
	Shilin	4		77		30847	
	Beitou	2		33		7289	
Total		72	100%	6182	100%	783099	100%

Figure 1 depicts the spatial distribution of regeneration projects developers sent out an application to the government and those that were later approved. Some preliminary findings are able to be concluded from comparison of Tables 9 and 10 and inspection of Figure 3. Developers are most interested in the central districts but projects in peripheral districts are most feasible. In addition, despite the government's intent to regenerate the old core districts, the developers have registered little interest.

Figure 3 Distribution of Projects Applied and Approved over Space





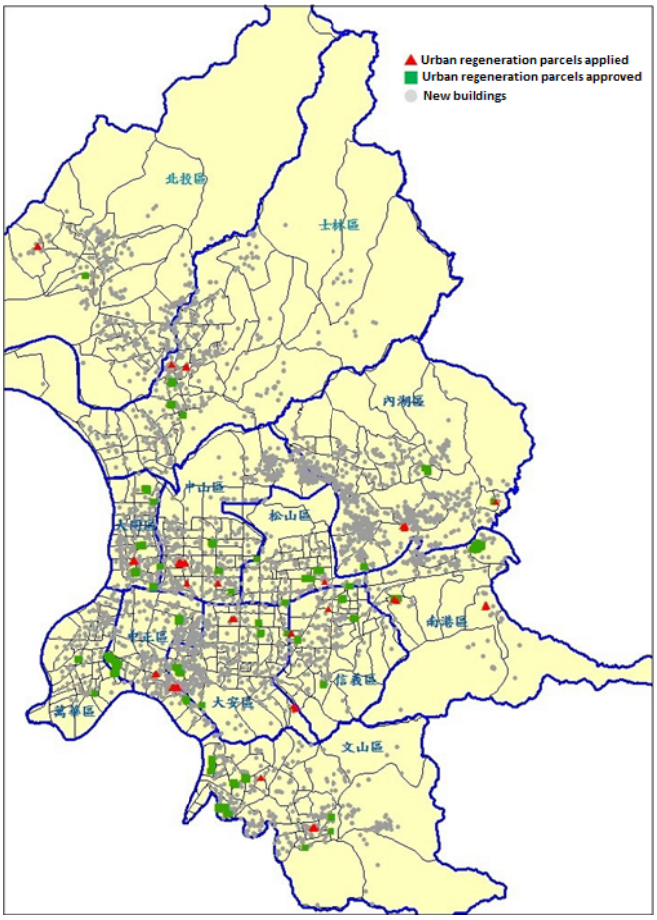
The Gap between Ideal and Reality

Taipei has witnessed a sustained high housing price over the last decade. It is also widely agreed that a long-term soaring housing price will harm the economic health and spatial growth of a city. Urban regeneration is not particularly aimed at supplying new space or suppressing housing price, it is also given other functions, such as the revitalization of urban functions and improvement of urban living environments, among others. However, developers in Taipei have put a high hope on urban regeneration scheme to assist them in acquiring sites. Legislations of urban regeneration have given developers more power than otherwise in assembling sites and even additional floor spaces given that they meet some requirements. Overall, city government and developers in Taipei have in recent years heavily relied on urban regeneration to redevelop sites and increase the housing supply.

In order to understand to what extent urban regeneration helps to supply new spaces, we have in this paper examined government-specified regeneration areas, regeneration projects developers have applied and those finally approved in the context of old core, central and peripheral districts. A number of consistent phenomena seem to have emerged. Firstly, old core, central and then peripheral districts are in the order of government's preferred areas for regeneration. Secondly, developers are most in favour of central districts for regeneration and least

interested in old core districts. Thirdly, the approved regeneration projects are mostly located in peripheral districts and few in old core districts. These observations are evidenced by the locations of regeneration projects (both applied and approved) shown on Figure 4.

Figure 4 Locations of UR Projects and other Building Projects



In light of the preference over location of regeneration by government and developers, there appears to be a discrepancy between policy goal and market outcome. Taipei government intends to revitalize first the districts that were developed earliest and with the most aged buildings and complicated land assembly problems. Even with the help of regeneration legislations, however, developers still prefer to redevelop sites in central districts. The central districts are now the economic heart of this city and where the high-valued housing located. The incentives that legislations provide, such as additional floor spaces, do not seem to be alluring enough to bring in more investment in old core districts. Application of regeneration projects shows the developers' preference over regeneration location, but not until the applications are approved would the supply of new space be possible. Once a project is approved, new spaces will be expected to appear in a few

years' time in the market. In order to be granted the approval, the developers are required to have obtained agreement of a certain percentage of land owners in the regeneration project. The figures of project application and approval in Taipei suggest that land owners of the central districts are difficult to negotiate, likely because of the high-valued sites they have. In the end, most approved projects are located in the peripheral districts. Houses in those districts are not as high-valued as in central districts, but their land owners are also not that difficult to negotiate with. It seems to be a compromise between policy and market.

The outcomes of promoting urban regeneration in Taipei can be summarized as follows. Regeneration scheme has brought new spaces primarily into peripheral districts where redevelopment pressure is least intense, and this scheme does not supply as much space as it intended into the old core districts where buildings are aged and land assembly difficult. In addition, developers are most interested in the expensive central districts where the market would be most likely to supply new spaces even without regeneration scheme. The recorded total building projects in Table 11 also shows that Daan and Zhongshan are two districts where building activities are most active. In contrast, the market shows little interest in Datong and Wanhua districts. Overall, the market outcomes are not entirely in line with the policy expectation.

Table 11 The Pipeline of Space Supply through Urban Regeneration

Districts		UR Areas	Projects Applied	Projects Approved	Total Building Projects
Old core	Datong	29	16	7	225
	Wanhua	25	11	2	139
	Zhongzheng	28	48	9	345
Centre	Zhongshan	21	58	8	486
	Songshan	11	29	8	176
	Xinyi	10	41	8	197
	Daan	14	80	7	490
Periphery	Wenshan	21	19	12	377
	Neihu	11	14	6	782
	Nangang	9	14	14	192
	Shilin	31	14	5	443
	Beitou	10	20	2	407

Total	220	364	88	4,259

Concluding Remarks

Taipei has for a long time acted as the leading economic, social and political hub for Taiwan. The recent years have however observed a number of phenomena in the city unfavourable to its continuing prosperity. Central to the causes of and the remedy to these adverse phenomena is the effectiveness of re-using or recycling the previously developed sites.

We analyze the official sets of data in respect of building demolition and construction over the years of 2001 to 2009 in Taipei city. Firstly, the supply of building spaces apparently cannot weaken the escalating housing price. The housing price has more than doubled over the past 10 years but the annual net supply of floor spaces has picked up by only slightly over 20% over the same period of time. Secondly, the majority of new buildings occur in the outer areas where raw land is supplied through public schemes. Areas where high-end markets dominate also have seen a modest new supply in that the high housing price warrants redevelopment. In contrast, few new spaces are supplied to the deteriorating areas where redevelopment is needed. Thirdly, given the unfavourable prospect of labour and housing rental markets, a timely and substantial new supply of buildings have become essential for Taipei's continuing leading edge.

Theories in respect of land supply and land redevelopment suggest a number of possible explanations for hoarding expensive plots not to be developed. Fragmented ownership, respective future use of a higher profit, market uncertainty, among others, are all potential contributing factors to vacant or under-utilized parcels in a city. No matter which factor or combination of factors cause land hoarding, the price of land and consequently the housing price will rise if the inertia of land supply has become significant. The recent housing boom around the globe has proven a daunting challenging not only to a country's economy and also to a city's growth and competitiveness.

In response to an ever escalating housing price, housing affordability has in recent years emerged to the surface as one of the policy issues that has received most attention. Urban regeneration although comprises multi-faceted purposes, supply of new spaces in place of old ones still dominates the policy practice in Taipei City. The statistical evidence indicates that buildings in Taipei in general are demolished much earlier than their physical life. This is a clear indication of market pressure over

under-utilized sites for a higher-density development. This is a natural market consequence in a city where the amount of land is limited but continues attracting households to immigrate. The additional supply of spaces through this redevelopment process shall be able to ease the price rise and benefits the city as a whole. However, the majority of redevelopment projects in Taipei have occurred not in the areas where redevelopment is urgently needed. That is to say, the market operates to supply new spaces but not always in the areas desirable from the social perspective.

References

Alonso, W. (1960) A Theory of Urban Land Market. Papers and Proceedings of the Regional Science Association, 6: 149-157.

Barlev, B. and May, J. (1976) The Effects of Property Taxes on the Construction and Demolition of Houses in Urban Areas. Economic Geography 52(4): 304-310.

Chang, C-O, Chen, M-C, Teng, H-J, and Yang, C-Y (2009) Is There a Housing Bubble in Taipei?- Hosing Price vs. Rent and Housing Price vs. Income. Journal of Housing Studies. 18(2): 1-22. (in Chinese)

DiPasquale, D. and Wheaton, W. (1996) Urban Economics and Real Estate Markets. London: Prentice-Hall.

Dye, R. and McMillen, D. (2007) Teardowns and Land Values in the Chicago Metropolitan Area. Journal of Urban Economics 61 (1): 45-63.

Evans, A. (1983) The Determination of the Price of Land. Urban Studies, 20(X): 119-129.

Glaeser, E. (2006) The Economic Impact of Restricting Housing Supply. Policy Briefs. RAPPAPORT Institute for Greater Boston, Kennedy School of Government, Harvard University.

Glaeser, E., Gyourko, J. and Saks, R. (2006) Urban Growth and Housing Supply. Journal of Economic Geography. 6: 71-89.

Neutze, Max (1986) The Supply of Land for a Particular Use, Urban Studies, 24(5): 379-388.

Shoup, Donald C. (1970) The Optimal Timing of Urban Land Development, Papers of The Regional Science Association, 25(1): 33–44.

Titman, S. (1986) Urban Land Price under Uncertainty. American Economic Review, 75(X): 505-514.

Weber, R., Doussard, M., Bhatte, S. D. and Mcgrath, D. (2006) Tearing the City Down: Understanding Demolition Activity in Gentrifying Neighborhoods. Journal of Urban

Affairs 28(1): 19-41.

計畫成果自評

本研究討論不動產估價成本法的觀念與應用，嘗試拓展此方法在學術上的深度。研究期間發現資料完整度無法符合原先預期，因此在研究重心上做了若干調整。將原先較為統計模型的方向，轉為與成本法相關的課稅估價及建物重建的相關政策議題。這樣的轉變雖非預期，卻意外地發現在相關政策上成本法的重要性，開啟了另一個研究的方向。本報告依據研究成果，以兩篇各自獨立之文章呈現。

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：100 年 6 月 27 日

計畫編號	NSC 98－2410－H－004－175－MY2		
計畫名稱	不動產估價成本法中重要觀念的討論與實證		
出國人員姓名	林子欽	服務機構及職稱	政治大學地政學系
會議時間	100 年 6 月 15 日至 100 6 年 月 18 日	會議地點	University of Technology of Eindhoven, Eindhoven, The Netherlands
會議名稱	(中文)歐洲不動產學會年會 (英文) European Real Estate Society Annual Conference		
發表論文題目	(中文)大都市中建築物之經濟壽命 (英文) Economic Life of Buildings in a Large City (中文)政策誘因可以增加衰敗地區的住宅供給嗎？ (英文) Can Policy Stimulants Increase Housing Supply in Run-down Areas?		

一、參加會議經過

本人於英國取得博士學位，多年來也持續參與歐洲不動產學會(European Real Estate Society, ERES)會議，今年也不例外。今年會議場所在荷蘭 Eindhoven。荷蘭

素以土地嚴格管制聞名，個人第一次參與 ERES 會議也是在荷蘭 Maastricht，因此格外具有意義。會議地點為 Eindhoven 的 Technology University，該校建築學院中設有不動產管理研究群。

由於個人研究領域為土地市場以及土地價格，因此參與之場次也多與這些議題相關，以下簡略報告其中幾場聆聽之文章。

在 keynote speech 中，荷蘭 Maastricht 大學 Professor Piet Eichholtz 分析美國綠建築對於租金的影響，詳盡的資料以及嚴謹的統計顯示，縱使符合綠建築規範需要付出較高成本，綠建築可以要求的租金明顯超過多出的成本。昆士蘭大學 Dr. Clive Warren 對於澳洲商用不動產的節能研究（energy efficiency），雖然不是直接處理綠建築的成本效益問題，但是也間接支持 Professor Eichholtz 的論點，建築物的節能效果是可能反映在租金的效益上。也就是說，綠建築是具有經濟效益的。這對於台灣目前積極推動的綠建築認證，具有正面的意義。

另外一個議題，是香港大學以及香港科技大學所提出，有關高樓樓住宅管理的問題。香港人口以及住宅密度極高，因此必須依賴類似臺灣的管委會來協調管理公共事務，這也造成典型的共有財使用問題。這兩篇文章都認為管理的好壞，是可以透過房價或租金反映出來。另外，制度設計也可能減輕住戶參與率偏低的問題。總而言之，市場以及制度是可能解決高密度住宅的公共財提供，以及品質低劣的弊病。

另一篇很有趣的文章，則是有關荷蘭的土地供給與地價決定，這是由 Radboud University Nijmegen 研究團隊所發表。他們透過分析工業土地價格發現，地方政府於決定地價時，確實合理考慮了相關市場因素，而且價格水準接近成本，荷蘭長期以來，地方政府都是工業土地的主要、甚至是獨供給占者。加上各地方政府間的競爭，該國工業土地長期以來價格穩定且極少炒作。荷蘭的土地供給以及政府角色，提供臺灣一個不同的思考觀點。Radboud University Nijmegen 為荷蘭土地市場研究重鎮，擁有規模極大的研究團隊。本人也藉此機會和該文作者之一 Professor Erwin van der Krabben 交換意見，未來也可伺機發展個人或校際合作。

二、與會心得

這次與會主要有兩方面心得；其一是不動產研究的取向，第二是不動產教育的發展。在研究取向上，歐洲地區自成與北美有別的體系，對於不動產研究以英國為首，但是近年也同時關心美國財務及量化方法的發展。在歐洲不動產學會年會中，任何與土地資源使用相關的議題都被視為不動產範疇，因此不僅可以聆聽不動產投資財務的文章，也有都市更新、住戶心理、住宅政策等議題，非常多元。另外歐洲大學對於不動產教育雖然受到美國量化取向的影響，增加財務相關課程，但是仍然保有其估價（surveying）的傳統，也就是學科整合的教學特色。

三、考察參觀活動(無是項活動者略)

Eindhoven 為飛利浦公司所在，也以產業創新聞名。飛利浦公司由於轉型所需，將若干生產線轉移他處，因此出現舊廠房利用的問題。有別於拆除出售的傳統模式，當地政府、飛利浦公司以及非營利住宅組織，多年來試圖再利用廢棄之舊廠房。大會特別安排與會者參觀這些舊廠房的利用。

舊廠房主要結構保留，並且以低廉租金出租給年輕初創業之公司。因此幾間小公司可以共同使用某一樓層，並且由非營利之組織協助對外行銷。這裡大多數的 start-up 公司，都與科技、多媒體有關。其中一間廠房，目前也提供年輕朋友從事滑板運動。整個沿著鐵路的廠區，經過多年經營，已經發展出特有的文化以及企業氛圍。如此一來，不但避免了常見的衰敗過程，甚至吸引建商興建住宅，未來也計劃興建地標式建築，可以視為成功的褐地再開發（brownfield redevelopment）案例。

四、建議

這次會議收穫甚豐，也從中體會到一些可供臺灣參考的經驗。首先在於臺灣不動產相關學科的研究與教育方面，我們未必要採美式財務取向，歐式多元取向似乎與地政傳統較為接近。另外，未來在臺灣舉辦國際會議時，可以適當地加入探討臺灣的特別場次，邀請各國學者參加，如此可以獲得更多不同的觀點。最後，臺灣學術會議中甚少業界參與，但是不動產是門應用科學，產官學如果能夠聚在一起研討，對於專業教育及產業品質的提升是極有助益的。

另外，這類的會議不僅具有學術交流功能，也是社交場合。臺灣大學的老師及研究生應積極提升語言能力，並盡量參與國際會議，拓展個人及臺灣海外網絡。本人也觀察到，大陸與會人數逐年上升，語言能力顯著進步，甚至也有多位留在歐洲大學任教。這些都是臺灣學者必須正視的。

今年共有五位臺灣學者與會。除本人外，尚有本人同事一位，臺北大學、長榮大學以及屏東商業技術學院各一位，皆為政大地政系系友。未來參與人數可以再增加，提升臺灣的影響力。

五、攜回資料名稱及內容

論文摘要集、紀念背包、Technology University of Eindhoven 不動產研究雜誌。

六、其他（發表論文內容）

Economic Life of Buildings in a Large City

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Abstract

To tear down or put up a building is not only an engineering matter, it involves also economic considerations. Moreover, pressure on land (re)development could be substantial in a city where housing price has skyrocketed. Physical fabrics play a critical role in a city's competitiveness but are constantly ignored in theories. An inert response of housing supply to economic needs is argued to likely contribute to an elevated housing price and subsequently wide-ranging adverse effects. Taipei has indeed in recent years suffered an escalating housing price and a number of unfavourable phenomena that seem to have met the dismal prediction. We examine in depth the official records of building demolition and construction in the hope to understand how the housing market has acted to the price signals. It is concluded that, firstly, the supply of building spaces does not seem to be able to lessen the escalating housing price. In addition, not only those old neighborhoods with aged buildings but also the pricey neighborhoods have observed most activities of teardowns. Thirdly, buildings made of concrete tend to be replaced significantly earlier than its end of physical life. In contrast, a notable proportion of brick and wood buildings stand longer than their physical life. Fourthly, a substantial number of new spaces are supplied on the raw land of the outer areas. But few new spaces are supplied to the deteriorating areas where redevelopment is in urgent need. Fifthly, no favourable prospect of labour or housing rental market is in a near sight, and therefore a timely and significant amount of new housing supply have become essential for Taipei's continuing leading edge. Finally, with the shrinking population islandwide including Taipei, the lack of incentive to redevelop deteriorating old neighborhoods might lead to a further decline of the inner city and financial difficulties with providing public facilities there.

Keywords: housing supply, land (re)development, teardowns, construction

City Competitiveness and Space Supply

A city is often presented as an agglomeration of people and firms where trade and production occur. In order for trade and production to take place, physical structures are required. The expansion of such economic activities, that is, urban growth, naturally calls for more supply of floor spaces. In a city where housing supply is elastic, when the city grows, the increase in demand is expected to bring forwards new supply of housing and more population, thus the corresponding increase in housing prices would be modest. The additional labour supply made possible through creation of new hosuing helps ensure that more demand on labour will not lead to a significant increase in wages. In comparison, in a city where housing supply is inelastic, when the city grows, impact will not be reflected on new construction or its population, but on housing price. Furthermore, not only will the price of houses rise, but also the wage in that the workers have to be compensated for the higher housing price. Some firms will therefore leave for places with a lower wage. People who afford to continue living in this city tend to be those with a higher wage and better skills. Younger people and talented outsiders will be priced out of the city. The consequent concentration of a small elite group might not immediately harm the city's economic vitality, but will be likely to damage its future. Alongside with the above line of arguments, Glaeser (2006) and Glaeser et al. (2006) highlight a number of adverse economic and social consequences when housing supply cannot keep pace with urban growth; including worsening housing affordability, declining urban population, greater volatility of housing price, shrinking employment and income, and less diversified demographic mix.

The inflexibility of housing supply could be resulting from a legal restriction imposed by the city or the natural scarcity of land. In the former case, the new supply can come forward through the relaxation of restriction. In contrast, for a city with a scanty supply of land and no place to expand, redevelopment of built-up sites at a higher density will be a most sensible policy. To tear down a building is not only an engineering matter, it involves also economic considerations. Barlev and May (1976) reason that buildings will be torn down when there are financial incentives to redevelop a site. They, through a case study of New York City, find that a heavier property tax, and a higher income level will hasten building demolition. In contrast, a higher interest rate, a larger building stock, a higher construction cost will prolong the time a building has stood. Weber et al. (2006) employ the logit model to investigate the determinants of tearing down a building. They suggest that aged buildings tend to suffer from functional obsolescence. A building inflicted with incurable functional obsolescence is likely to be torn down earlier than others. The degree of building depreciation therefore represents the likelihood that a building will be torn down. Empirical evidence suggests a higher age, a lower floor-to-land ratio, a better

access to public transportation and Chicago Lake will raise the possibility of a building to be knocked down sooner. Dye and McMillen (2007) also examines the Chicago metropolitan areas, and find the followings factors to be positively associated with the occurrence of building teardowns: better access to rapid transit line and Lake Michigan, a larger lot site, a higher floor-to-land ratio, among others. They also find the price of those properties that were demolished soon after their sales is irrelevant to building attributes (building materials, design style…). The price paid for those soon-to-be-demolished properties is for the land only.

These studies clearly suggest that demolition of a building, in particular in a major city, is largely an economic phenomenon. The possibility of a building to be torn down is not uniform across neighborhoods, and can reasonably be explained by a number of economic and social parameters. In addition, the teardowns possibility is associated with the expected value of a new property on a redeveloped site, especially in a city with scarcity of land. Moreover, pressure of land redevelopment is great in a city where demand significantly outstrips supply. In consequence, buildings in such a city are prone to be knocked down far ahead of the time when they are physically obsolete. In other words, the economic life of a building is shorter than its physical life. The timing of a building to be torn down is primarily explained by three groups of factors: the characteristics of building itself (materials, design…), accessibility to transport nodes and amenity (rapid transit line, lake…), as well as socio-economic conditions (income, land use zoning…).

To tear down a building is not only an engineering matter, it involves also economic considerations. Barlev and May (1976) reason that buildings will be torn down when there are financial incentives to redevelop a site. They, through a case study of New York City, find that a heavier property tax, and a higher income level will hasten building demolition. In contrast, a higher interest rate, a larger building stock, a higher construction cost will prolong the time a building has stood. Weber et al. (2006) employ the Logit model to investigate the determinants of tearing down a building. They suggest that aged buildings tend to suffer from functional obsolescence. A building inflicted with incurable functional obsolescence is likely to be torn down earlier than others. The degree of building depreciation therefore represents the likelihood that a building will be torn down. Empirical evidence suggests a higher age, a lower floor-to-land ratio, a better access to public transportation and Chicago Lake will raise the possibility of a building to be knocked down sooner. Dye and McMillen (2007) also examines the Chicago metropolitan areas. They find the followings factors to be positively associated with the occurrence of building teardowns: better access to rapid transit line and Lake Michigan, a larger lot site, a higher floor-to-land ratio, among others. They also find the price of those properties

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These studies clearly suggest that demolition of a building, in particular in a major city, is largely an economic phenomenon. The possibility of a building being torn down is not uniform across neighborhoods, and can reasonably be explained by a number of economic and social parameters. In addition, the teardowns possibility is associated with the expected value of a new property on a redeveloped site, especially in a city with scarcity of land. Moreover, pressure of land redevelopment is great in a city where demand significantly outstrips supply. In consequence, buildings in such a city are prone to be knocked down far ahead of the time when they are physically obsolete. In the context of property valuation, the economic life of a building is shorter than its physical life. The timing of a building to be torn down is primarily explained by three groups of factors: the characteristics of building itself (materials, design…), accessibility to transport nodes and amenity (rapid transit line, lake…), as well as socio-economic conditions (income, land use zoning…).

Supply of New Space in Taipei over Time

Taipei at the end of year 2009 has 2,607,428 inhabitants over the area of 271.8 km^2, leading to a desnity of 9,593 inhabitants per km^2. Despite the slight decline in population of the city in recent years, the number of household has been on a steady rise. Mountains and rivers surrounding Taipei are on the other hand topographical constraints for this city to grow. The steadily rising demand for and limited supply of land put together have created a framework in wihch developers seek to find sites for new development. It is obligatory in Taiwan to apply for a permit to demolish or construct a building. Therefore, the official record of building demolition and construction provides a reliable source. Through years 2001 to 2010, the housing price in Taipei has more than doubled, but the accompanying additional floor spaces have not kept up with the soaring price. In the meanwhile, the new households continue to form up to the present. (see Table 1) Chang et al. (2009) detect an apparent price bubble in Taipei housing market. The housing price has been overvalued by 38% and 27% compared to price/income and price/rent ratio derived fundamental prices, respectively. These phenomena suggest an inelastic housing supply in the city, and a dominant economic driver this city has played.

Table 1 Housing price, new floor spaces, and household units over time

Years	Sin-Yi Housing price index (Q4)	New Floor Space as % of total stock	Household Units

2001	105.93	2.12%	894,763
2002	107.91	2.11%	906,988
2003	115.95	1.91%	914,716
2004	132.08	1.94%	923,325
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2006	166.64	1.46%	941,317
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2008	182.47	1.93%	958,433
2009	220.03		969,418

Source: Sin-Yi Realty http://www.sinyi.com.tw/news/news-estate.aspx and Taipei City Statistics Department

These statistical evidence as a whole fit well into the arguments put forward in Glaeser (2006) and Glaeser et al. (2006). If their predictions are largely correct, Taipei will be soon, or maybe already is, suffering from the adverse consequences of an inelastic housing supply. One natural possible way to rectify the inelasticity problem is to bring forwards more new housing units into the market, either through urban expansion or redevelopment.

This piece of work does not attempt to address in details whether Taipei has exhibited the inelasticity symptoms. We rather are convinced that it has. Our task instead is to examine how the market has responded. We particularly take a spatial perspective to study the activities of tearing down old buildings and erecting new ones. We hope to find the geographical and associated patterns of these activities in Taipei where land supply is strictly limited, and to the extent possible point out the likely impacts of these patterns on Taipei's future growth.

Table 2 provides details on the net additions of building spaces, new spaces less torn-down spaces, from 2001 through 2009 across individual districts. Despite the housing price has risen during this period of time by 107.7%, the building spaces only has increased by 21.2%. The sharp contrast highlights the inert response of building supply to housing price. In addition, it is noted that Neihu leads by a substantial margin other districts in supplying additional spaces. Neihu is an area on the east of Taipei where many new developments have been happening. In contrast, Datong and Wanhua, on the west part of the city, are early-developed areas where buildings are overall much older than other parts of the city. However, these two old districts have seen the smallest shares of additional supply of spaces. The additional building spaces distribute in an unequal way.

Table 2 Annual net additions of building spaces across districts

Districts	2001	2002	2003	2004	2005	2006	2007	2008	200
Shilin	225192	272353	129102	143561	199188	103965	259965	316322	2
Datong	116372	62403	48914	15778	66762	97641	104152	40537	4
Daan	165162	101921	168568	231425	267575	204692	120747	342851	25
Zhongshan	244429	262894	438440	491107	515191	180316	439841	272155	39
Zhongzheng	148163	153476	125701	142936	115183	153347	138457	329072	19
Neihu	945213	919077	519591	461678	555002	426941	602005	842076	69
Wenshan	148034	147995	203026	81166	161024	177254	269088	217115	24
Beitou	186667	165314	157035	224323	179424	218236	262412	298006	19
Songshan	326765	371606	71966	231197	98666	145373	78502	37195	22
Xinyi	178048	239942	416174	297076	130050	203504	233034	88547	20
Nangang	63679	107096	244930	271094	38585	253427	111529	379532	26
Wanhua	39187	111425	55330	107379	41057	43654	88177	94550	4
Total	2786917	2915507	2578783	2698727	2367712	2208356	2707914	3257965	337

We further disaggregate the distribution of net building spaces into smaller spatial units (see Figure 1). On a visual inspection, building supply seems to exhibit a clustering pattern. The additional building spaces tend to occur in some specific areas. Generally speaking, the majority of them appear in the outer parts of the city, but some sporadic units with a higher level of net space supply are observed in the old city areas.

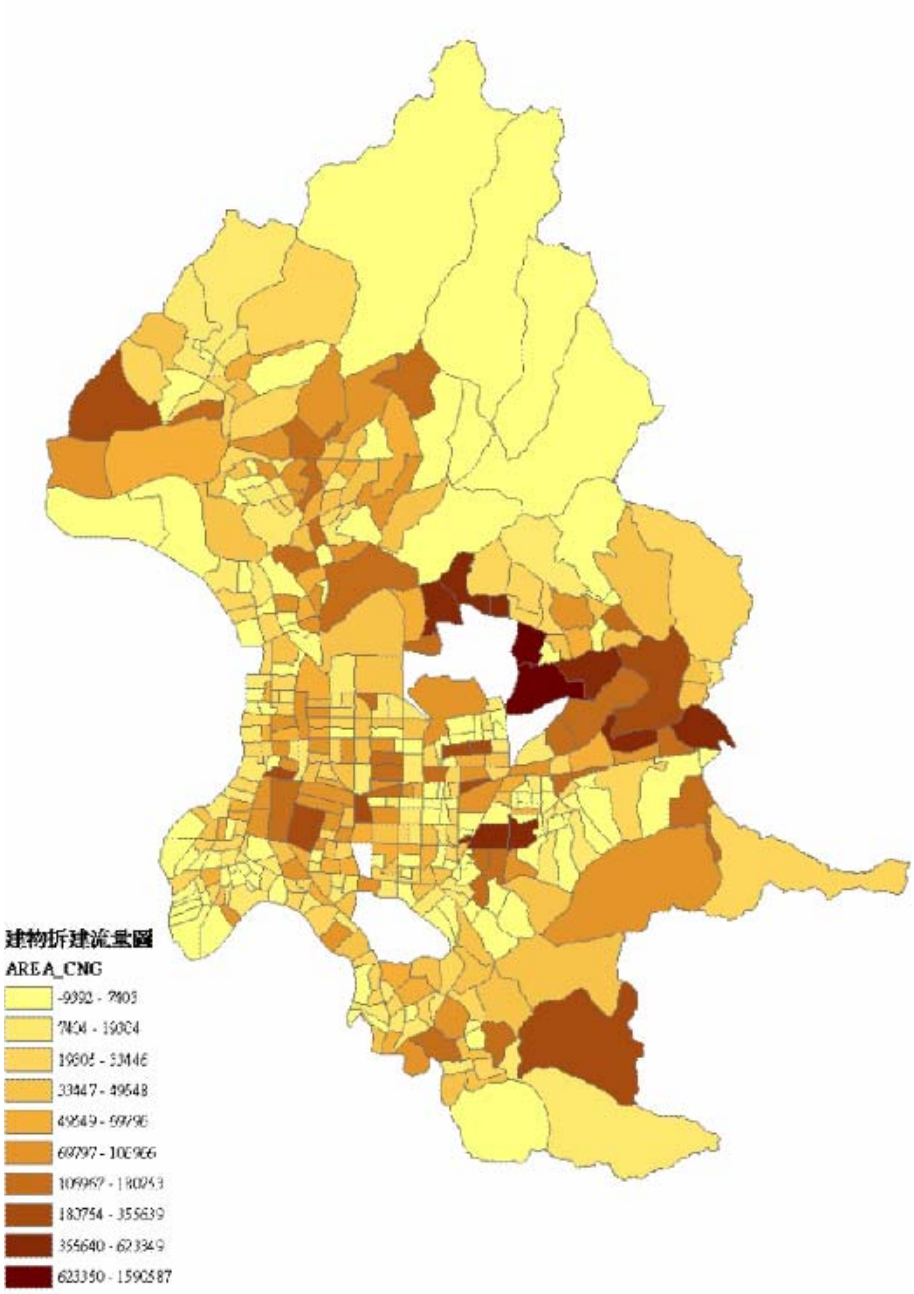

Figure 1 New additions of building spaces over locations

Economic Life of Buildings and Land Recycling

Figure 2 indicates the location of demolished buildings over the study years. Table 3 also provides statistics of the demolished floor areas and its share of the whole stock for respective materials of buildings. Despite it is difficult to conclude if a demolition rate is desirable. Wooden and brick buildings are with little doubt to be judged as under-developed and expected to be replaced by high-rise buildings. The figures in Table 3, however, suggest that more than 200 years will be needed for all the wooden and brick buildings to disappear. It is believed that the legal, such as complex multi-ownership, and

not economic obstacles have contributed to the delayed demolition. This will lead to an inefficient land use for sites are not allocated for a more economically productive purpose.

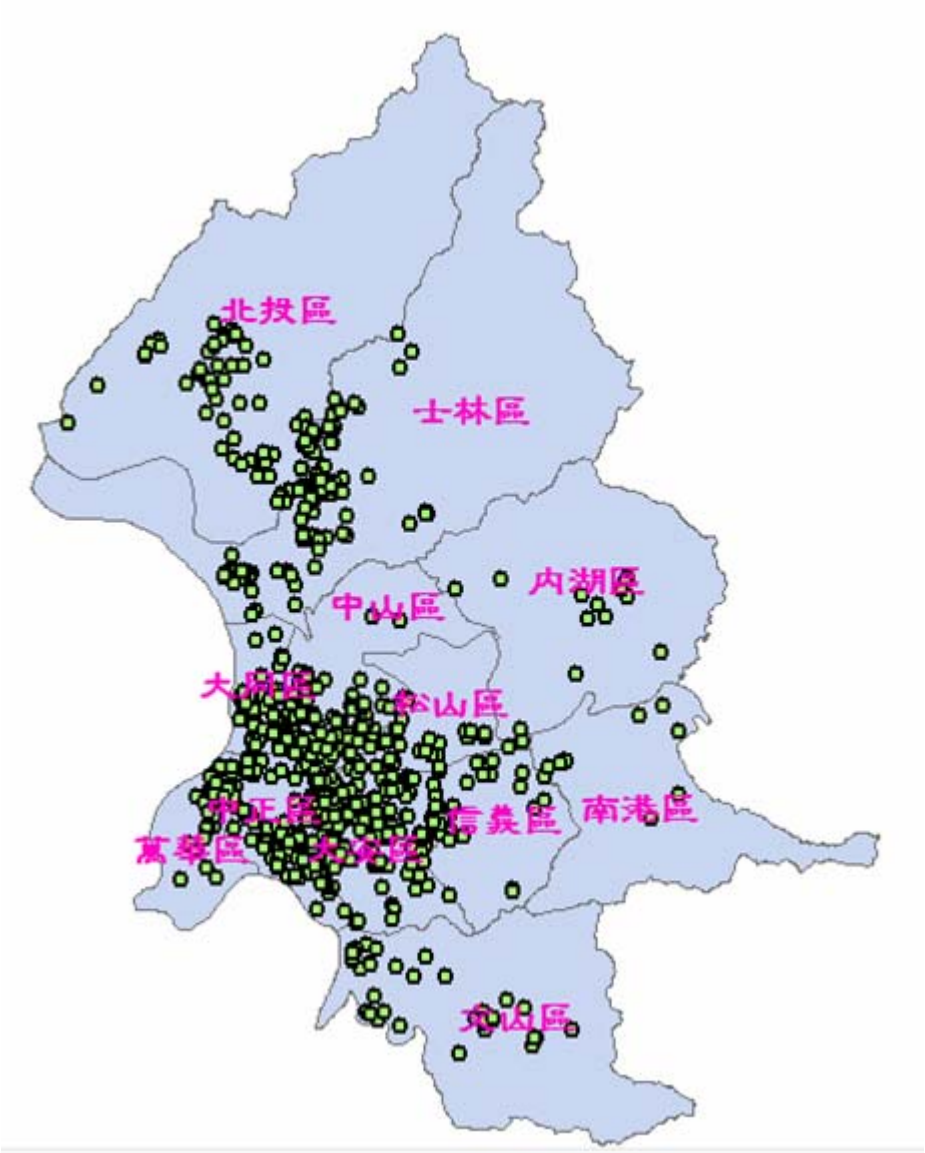

Figure 2: Location of Demolished Buildings

Table 3: Floor-areas (m^2) of demolished buildings and the percentage in its stock (2001.1-2008) by materials over time

	2001	2002	2003	2004	2005	2006	2007	2008	Total
Concrete	5222	20121	42354	53610	64786	75155	73721	86673	421642
	0.01%	0.02%	0.04%	0.05%	0.05%	0.06%	0.06%	0.07%	0.04%

Reinforc	18577	10765	24132	33462	56797	24233	54025	52944	274935
ed-brick	0.15%	0.08%	0.19%	0.26%	0.44%	0.19%	0.42%	0.41%	0.27%
Brick	1982	5523	8520	8453	11702	13852	38961	17825	106818
	0.08%	0.23%	0.35%	0.35%	0.49%	0.57%	1.61%	0.72%	0.55%
Wood	3641	7431	3940	2138	3276	2879	3812	3726	30843
	0.45%	0.92%	0.49%	0.27%	0.42%	0.41%	0.58%	0.55%	0.51%
Total	29422	43840	78946	97663	136561	116119	170519	161168	834238

We further select the 692 buildings with information of their age when knocked down. The distributions of building ages for respective materials are shown in Table 4. The age of the majority of buildings torn down ranges between 26 to 45, significantly ahead of their physical durable ages. Approximately one-fifth of the buildings were even knocked down before they have reached 25 years. In contrast to the law-specified building physical life for purpose of property taxation (see Table 5), it is noted that all demolished concrete buildings were knocked down before they reached their physical life. As high as 40% of demolished concrete buildings even did not reach half of their physical life. A small percentage of reinforced-brick buildings were over 52 years when torn down. In contrast, a relatively larger percentage of brick and wood buildings survive their physical life. Due to data constraints, we, however, are not aware if there are and how many buildings have outlived their physical life and remain in use.

Table 4: Distribution of building ages when demolished

Year	<5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Total
Concrete	8	2	3	19	33	43	69	52	30	13	1	0	273
Reinforced-Brick	6	2	0	1	5	18	32	96	88	63	18	1	330
Brick	1	1	0	2	8	10	2	18	16	11	3	0	72
Wood	1	0	0	1	2	6	2	1	2	2	0	0	17
Total	16	5	3	23	48	77	105	167	136	89	22	1	692

Table 5: Law-specified annual depreciation, physical life and salvage value

Structure materials	Annual	Physical life	Salvage value (%)

	depreciation (%)	(years)	
Reinforced concrete	1%	60	40%
Reinforced brick	1.2%	52	37.6%
Brick	1.4%	46	35.6%
Wood	2%	35	30%

Even though it is necessary for buildings to be knocked down for future development, a too-early demolition also represents waste of resources and disjoint between urban plan and market reality. It also raises curiosity that a respective 19% and 29% of brick and wooden buildings had passed their physical life when torn down. It is practically easy and economically sound to knock down such low-density buildings to accommodate expanding population and activities. But the figures suggest that redevelopment did not move as smoothly as normally expected. A delayed redevelopment on those desirable sites displays another policy puzzle to be explored.

As suggested earlier, Taipei is short of land but pressure from demand has kept mounting evidenced by the escalating housing price. Outstrip of demand over supply naturally calls for redevelopment of built-up sites. Table 6 looks into the teardown-building up or land recycling phenomenon. Within our expectation, Neihu has registered the largest number of new development projects primarily on raw land (merely 4.04% of projects are on previously developed sites). The number of new development projects in Daan is in the third place, and as high as 88.15% of them were built on previously developed sites. Neihu is on the east outwards of the city and with a large stock of raw land primarily supplied through public schemes of land readjustment. In contrast, Daan was developed much earlier and has been the most expensive areas, and recycled sites provide the major sources of land for new development. For those development projects that were built on the redeveloped sites, the average time span between teardown and construction ranges between 2.5 and 3.5 years. This figure suggests that a new building would soon be erected after an old one was torn down. In a city where housing price is high, the developers cannot afford leaving a site idle for too long.

Table 6 Building teardowns and construction over years of 2001-2009

Districts	Accumulated new development projects (A)	Redevelopment on the same sites (B)	Projects built on the same sites (B/A) in percentage	Average years between knockdowns and development
Shilin	422	105	24.88	2.74
Datong	223	60	26.91	2.72
Daan	464	409	88.15	3.12
Zhongshan	471	108	22.93	2.55
Zhongzheng	329	137	41.64	3.07
Neihu	742	30	4.04	2.63
Wenshan	366	21	5.74	2.55
Beitou	386	58	15.03	2.77
Songshan	167	23	13.77	2.74
Xinyi	183	18	9.84	2.46
Nangang	179	20	11.17	2.71
Wanhua	136	31	22.79	3.48
Total/average	4068	1020	23.91	2.8

Concluding Remarks

Taipei has for a long time acted as the leading economic, social and political hub for Taiwan. The recent years have however observed a number of phenomena in the city unfavourable to its continuing prosperity. Central to the causes of and the remedy to these adverse phenomena is the effectiveness of re-using or recycling the previously developed sites.

We analyze the official sets of data in respect of building demolition and construction over the years of 2001 to 2009 in Taipei city. Firstly, the supply of building spaces apparently cannot weaken the escalating housing price. The housing price has more than doubled over the past 10 years but the annual net supply of floor spaces has picked up by only slightly over 20% over the same period of time. Secondly, the majority of new buildings occur in the outer areas where raw land is supplied through public schemes. Areas where high-end markets dominate also have seen a modest new supply in that the high housing price warrants redevelopment. In contrast, few new spaces are supplied to the deteriorating areas where redevelopment is needed. Thirdly, given the unfavourable prospect of labour and housing rental markets, a timely and substantial new supply of buildings have become essential for Taipei's continuing leading edge.

References

Barlev, B. and May, J. (1976) The Effects of Property Taxes on the Construction and Demolition of Houses in Urban Areas. Economic Geography 52(4): 304-310.

Chang, C-O, Chen, M-C, Teng, H-J, and Yang, C-Y (2009) Is There a Housing Bubble in Taipei?- Hosing Price vs. Rent and Housing Price vs. Income. Journal of Housing Studies. 18(2): 1-22. (in Chinese)

DiPasquale, D. and Wheaton, W. (1996) Urban Economics and Real Estate Markets. London: Prentice-Hall.

Dye, R. and McMillen, D. (2007) Teardowns and Land Values in the Chicago Metropolitan Area. Journal of Urban Economics 61 (1): 45-63.

Glaeser, E. (2006) The Economic Impact of Restricting Housing Supply. Policy Briefs. RAPPAPORT Institute for Greater Boston, Kennedy School of Government, Harvard University.

Glaeser, E., Gyourko, J. and Saks, R. (2006) Urban Growth and Housing Supply. Journal of Economic Geography. 6: 71-89.

Weber, R., Doussard, M., Bhatte, S. D. and Mcgrath, D. (2006) Tearing the City Down: Understanding Demolition Activity in Gentrifying Neighborhoods. Journal of Urban Affairs 28(1): 19-41.

Can Policy Stimulants Increase Housing Supply in Run-down Areas?

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Some Stylized Facts of Taipei City

Glaeser (2006) and Glaeser et al. (2006) suggest a number of adverse economic and social consequences when housing supply cannot keep pace with urban growth; including worsening housing affordability, declining urban population, greater volatility of housing price, shrinking employment and income, and less diversified demographic mix. It is the high housing price resulting from an insufficient supply that causes people and firms to leave the city, and households that remain inside paying an unsustainably high proportion of their income in house. The authors believe that Manhattan has started showing the above-mentioned symptoms. Taipei, as the leading economic and political centre of Taiwan, has been consciously devoted to keeping its competitiveness edge, not only inside the island but also overseas. However, Taipei is no exception to the recent global property boom. Through years 2001 to 2010, the housing price in Taipei has more than doubled, but the accompanying additional floor spaces have not kept up with the soaring price. In the meanwhile, the new households continue to form up to the present. (see Table 1) Chang et al. (2009) detect an apparent price bubble in Taipei housing market. The housing price has been overvalued by 38% and 27% compared to price/income and price/rent ratio derived fundamental prices, respectively.

Table 1 Housing price, new floor spaces, and household units over time

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Source: Sin-Yi Realty http://www.sinyi.com.tw/news/news-estate.aspx and Taipei City

Statistics Department

These statistical evidence as a whole fit well into the arguments put forward in Glaeser (2006) and Glaeser et al. (2006). If their predictions are largely correct, Taipei will be soon, or maybe already is, suffering from the adverse consequences of an insufficient supply of housing. Another piece of evidence that demonstrates the lag of supply behind demand is the relatively low age of buildings when they are torn down. Lin (2011) finds the average age of demolished buildings in Taipei was around 30 years, far below their physical durable age. As Taipei is as a whole a fully developed city, buildings are knocked down primarily to give way for new development of taller buildings. In the context of a pressure on redevelopment to supply new and more housing spaces, approximately 26% of present buildings are ready to be replaced (Table 2) in that they are over 30 years.

Table 2 Distribution of Building Ages in Taipei City

Age	Household	%	Floor space(m^2)
<1	4,635	0.5	435,227
2~5	51,217	6.0	4,809,276
6~10	66,549	7.8	6,248,951
11~15	55,315	6.5	5,194,079
16~20	106,483	12.5	9,998,754
21~25	175,243	20.5	16,455,318
26~30	173,835	20.3	16,323,107
31~35	113,230	13.2	10,632,297
36~40	62,598	7.3	5,877,952
41~45	22,481	2.6	2,110,966
46~50	8,770	1.0	823,503
>50	14,626	1.7	1,373,381
Total	854,982	100.0	80,282,810

Regeneration Areas, Project Application and Approval

Article 1 of Urban Regeneration Act states, "This Act is enacted to promote a well-planned urban land redevelopment, revitalize urban functions, improve urban living environments, and to increase public interest." Although urban regeneration can be undertaken through reconstruction (demolition followed by rebuildings), remodeling or maintenance of buildings (Article 4), most regeneration projects are undertaken through reconstruction. Naturally, districts developed early and with more aged buildings are

susceptible to be included in regeneration projects. The 12 districts of Taipei City can be divided into three categories in light of its development history; old core (developed earliest by the river), centre (developed later), and periphery (the outskirts and less densely inhabited).

The urban regeneration areas are designated by Taipei government, thus indicates its preference over regeneration location. Also, the designated regeneration areas are a broader area within which the boundary of a regeneration project needs to be further specified. As expected, the figures in Table 3 shows designated regeneration areas located in old core districts accounts for 40.4% of the total areas (in terms of number). These figures indicate the government's strong intent to renew the old core areas.

Table 3 Designated Urban Regeneration Areas over Districts

Districts		Designated areas NO.	percentage
Old core	Datong	29	40.4%
	Wanhua	25	
	Zhongzheng	28	
Centre	Zhongshan	21	27.6%
	Songshan	11	
	Xinyi	10	
	Daan	14	
Periphery	Wenshan	21	32%
	Neihu	11	
	Nangang	9	
	Shilin	14	
	Beitou	10	
Total		203	100%

Although Taipei government has indicated its preference over the location of regeneration areas, it is not the government but the developers who are undertaking the projects. The developers are allowed to apply for a regeneration project inside out outside the regeneration areas. If the applied projects are located within the government pre-specified regeneration areas, the procedure will be simpler, time spent shorter and chance of being approved higher. If the applied projects are outside the pre-specified regeneration areas, the application is expected to take longer. The locations for a

regeneration project favourable to developers will be revealed from the locations of regeneration projects applied to the government. Table 4 clearly shows that central districts are most favoured by developers, followed by peripheral districts and finally the districts in the old core. The sharp contrast between Table 3 and Table 4 clearly shows the different preference between government and developers as to locations for regeneration projects.

Table 4 Urban Regeneration Projects Applied (years 2001 to 2010)

Districts		No. applied	Percentage
Old core	Datong	16	19.7%
	Wanhua	11	
	Zhongzheng	48	
Centre	Zhongshan	58	54.6%
	Songshan	29	
	Xinyi	41	
	Daan	80	
Periphery	Wenshan	19	25.7%
	Neihu	14	
	Nangang	14	
	Shilin	31	
	Beitou	20	
Total		381	100%

Taipei government will examine every application project and based on its plan and preliminary study to decide on if to give a go-ahead. Table 5 provides the statistics of applications that are later approved. Only when a project is approved will it later supply new spaces to the district it is located. Over 44% of approved projects occur in peripheral districts, followed by central districts, and finally the old-core districts.

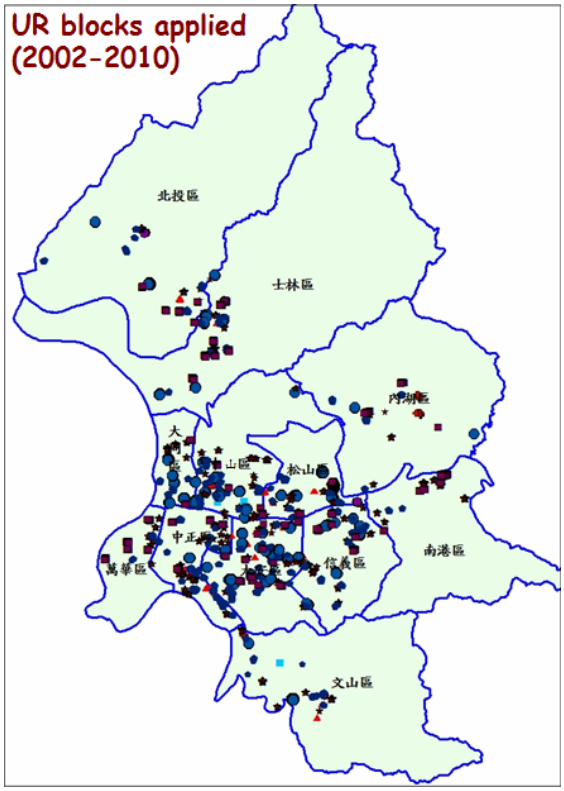
Table 5 Urban Regeneration Projects Approved (years 2001 to 2010)

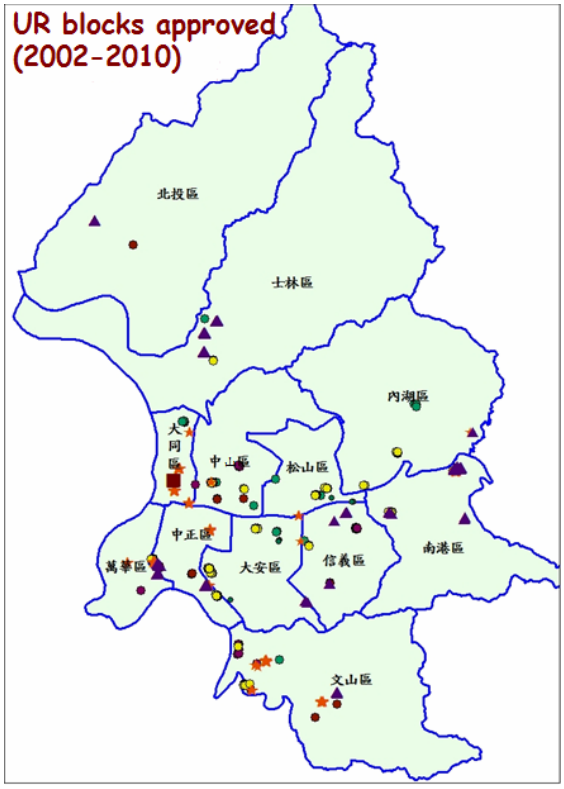
Districts		No. approved	Percentage
Old core	Datong	7	20.5%
	Wanhua	2	
	Zhongzheng	9	

Centre	Zhongshan	8	35.2%
	Songshan	8	
	Xinyi	8	
	Daan	7	
Periphery	Wenshan	12	44.3%
	Neihu	6	
	Nangang	14	
	Shilin	5	
	Beitou	2	
Total		88	100%

Figure 1 depicts the spatial distribution of regeneration projects developers sent out an application to the government and those that were later approved. Some preliminary findings are able to be concluded from comparison of Tables 4 and 5 and inspection of Figure 1. Developers are most interested in the central districts but projects in peripheral districts are most feasible. In addition, despite the government's intent to regenerate the old core districts, the developers have registered little interest.

Figure 1 Distribution of Projects Applied and Approved over Space





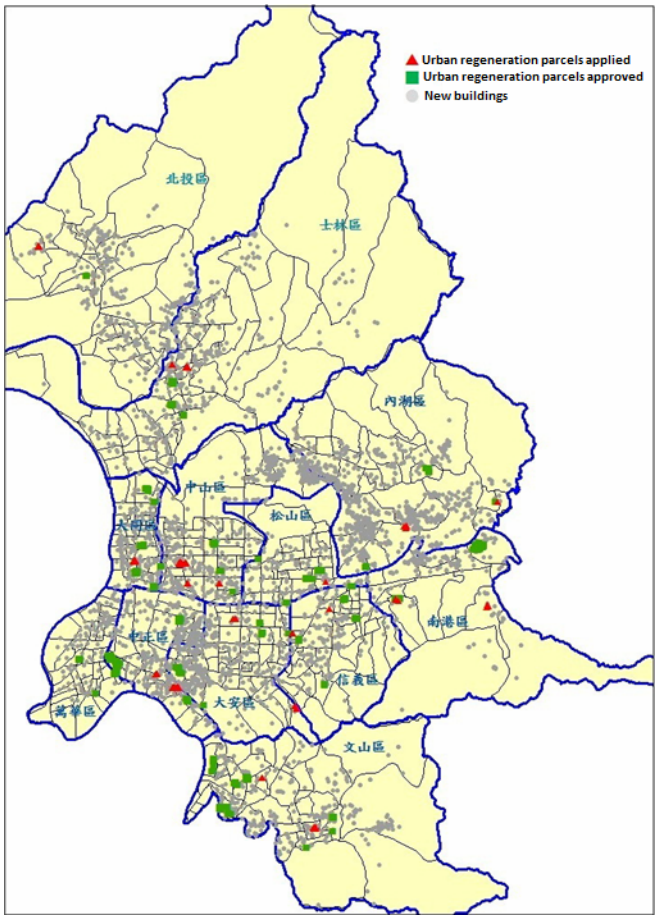
The Gap between Ideal and Reality

Taipei has witnessed a sustained high housing price over the last decade. It is also widely agreed that a long-term soaring housing price will harm the economic health and spatial growth of a city. Urban regeneration is not particularly aimed at supplying new space or suppressing housing price, it is also given other functions, such as the revitalization of urban functions and improvement of urban living environments, among others. However, developers in Taipei have put a high hope on urban regeneration scheme to assist them in acquiring sites. Legislations of urban regeneration have given developers more power than otherwise in assembling sites and even additional floor spaces given that they meet some requirements. Overall, city government and developers in Taipei have in recent years heavily relied on urban regeneration to redevelop sites and increase the housing supply.

In order to understand to what extent urban regeneration helps to supply new spaces, we have in this paper examined government-specified regeneration areas, regeneration projects developers have applied and those finally approved in the context of old core, central and peripheral districts. A number of consistent phenomena seem to have emerged. Firstly, old core, central and then peripheral districts are in the order of government's preferred areas for regeneration. Secondly, developers are most in favour of central districts for regeneration and least interested in old core districts. Thirdly, the approved regeneration projects are mostly located in peripheral districts and few in old core districts. These observations are evidenced by the locations of regeneration

projects (both applied and approved) shown on Figure 2.

Figure 2 Locations of UR Projects and other Building Projects



In light of the preference over location of regeneration by government and developers, there appears to be a discrepancy between policy goal and market outcome. Taipei government intends to revitalize first the districts that were developed earliest and with the most aged buildings and complicated land assembly problems. Even with the help of regeneration legislations, however, developers still prefer to redevelop sites in central districts. The central districts are now the economic heart of this city and where the high-valued housing located. The incentives that legislations provide, such as additional floor spaces, do not seem to be alluring enough to bring in more investment in old core districts. Application of regeneration projects shows the developers' preference over regeneration location, but not until the applications are approved would the supply of new space be possible. Once a project is approved, new spaces will be expected to appear in a few years' time in the market. In order to be granted the approval, the developers are required to have obtained agreement of a certain percentage of land owners in the regeneration project. The figures of project application and approval in Taipei suggest that land owners of the central districts are difficult to negotiate, likely because of the

high-valued sites they have. In the end, most approved projects are located in the peripheral districts. Houses in those districts are not as high-valued as in central districts, but their land owners are also not that difficult to negotiate with. It seems to be a compromise between policy and market.

The outcomes of promoting urban regeneration in Taipei can be summarized as follows. Regeneration scheme has brought new spaces primarily into peripheral districts where redevelopment pressure is least intense, and this scheme does not supply as much space as it intended into the old core districts where buildings are aged and land assembly difficult. In addition, developers are most interested in the expensive central districts where the market would be most likely to supply new spaces even without regeneration scheme. The recorded total building projects in Table 6 also shows that Daan and Zhongshan are two districts where building activities are most active. In contrast, the market shows little interest in Datong and Wanhua districts. Overall, the market outcomes are not entirely in line with the policy expectation.

Table 6 The Pipeline of Space Supply through Urban Regeneration

Districts		UR Areas	Projects Applied	Projects Approved	Total Building Projects
Old core	Datong	29	16	7	225
	Wanhua	25	11	2	139
	Zhongzheng	28	48	9	345
Centre	Zhongshan	21	58	8	486
	Songshan	11	29	8	176
	Xinyi	10	41	8	197
	Daan	14	80	7	490
Periphery	Wenshan	21	19	12	377
	Neihu	11	14	6	782
	Nangang	9	14	14	192
	Shilin	31	14	5	443
	Beitou	10	20	2	407
Total		220	364	88	4,259

References

Barlev, B. and May, J. (1976) The Effects of Property Taxes on the Construction and Demolition of Houses in Urban Areas. Economic Geography 52(4): 304-310.

Chang, C-O, Chen, M-C, Teng, H-J, and Yang, C-Y (2009) Is There a Housing Bubble in Taipei?- Hosing Price vs. Rent and Housing Price vs. Income. Journal of Housing Studies. 18(2): 1-22. (in Chinese)

DiPasquale, D. and Wheaton, W. (1996) Urban Economics and Real Estate Markets. London: Prentice-Hall.

Dye, R. and McMillen, D. (2007) Teardowns and Land Values in the Chicago Metropolitan Area. Journal of Urban Economics 61 (1): 45-63.

Glaeser, E. (2006) The Economic Impact of Restricting Housing Supply. Policy Briefs. RAPPAPORT Institute for Greater Boston, Kennedy School of Government, Harvard University.

Glaeser, E., Gyourko, J. and Saks, R. (2006) Urban Growth and Housing Supply. Journal of Economic Geography. 6: 71-89.

Lin, Tzu-Chin (20101) Economic Life of Buildings in Taipei, working paper presented in ERES, Eindhoven, 2011.

Weber, R., Doussard, M., Bhatte, S. D. and Mcgrath, D. (2006) Tearing the City Down: Understanding Demolition Activity in Gentrifying Neighborhoods. Journal of Urban Affairs 28(1): 19-41.

國科會補助計畫衍生研發成果推廣資料表

日期:2011/11/03

國科會補助計畫	計畫名稱: 不動產估價成本法中重要觀念的討論與實證
	計畫主持人: 林子欽
	計畫編號: 98-2410-H-004-175-MY2　　學門領域: 地政

無研發成果推廣資料

98 年度專題研究計畫研究成果彙整表

計畫主持人：林子欽	計畫編號：98-2410-H-004-175-MY2
計畫名稱：不動產估價成本法中重要觀念的討論與實證	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	1	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
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國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	2	0	100%		
		專書	0	1	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
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	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
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本研究依內容目前正撰寫為兩篇報告. 北京大學林肯土地中心和中研院社會科學研究中心. 已分別對於文稿表示興趣. 目前正洽談及撰寫中/預計未來一兩年內將會收入其所編專書中.