We explore the influence of property taxes on home prices, taking advantage of a policy experiment of property taxation in Shanghai and in Chongqing starting from January 2011. Using the approach suggested by Hsiao, Ching and Wan (2012) we estimate hypothetical home prices in the absence of property taxation for Shanghai and Chongqing using home prices in other cities and provinces. We show that the OLS generates consistent estimators when the prices series are non-stationary I(1) processes. We apply the model to a panel of average home prices of 31 cities and provinces in China, and find the property-tax experiment lowered the Shanghai average home price by 11%–15% but raised the Chongqing average home prices by 10%–12%. An examination of the policy details and data on prices by home types suggests the post-treatment price increase in Chongqing can be driven by a spillover effect from high-end to low-end properties.

1. Introduction

How do property taxes influence home prices? The literature on local public finance says the effect should be strictly negative, as long as property taxes are, at least partially, capitalized.\(^1\) Intuitively, property taxation imposes additional user costs on a property and thus reduces its value. Under full capitalization, differences in home prices exactly equal the present discounted value of variations in expected property tax liabilities. To see this, suppose a property has a finite life span of \(n\) years. Let \(P_t\) be its market value in year \(t\) (\(1 \leq t \leq n\)). \(Y_t\) is the inflow of property value in year \(t\). \(i\) is the interest rate and \(\tau\) the property tax rate. Under standard assumptions,

\[
P_t = \sum_{s=1}^{n} \frac{(Y_s - \tau P_s)}{(1 + i)^{t-s}}
\]

(1)

Apparently, \(P_t\) declines in \(\tau\).

However, testing the influence of property taxes on home prices involves several difficulties. Firstly, the causality can run from \(P\) to \(\tau\). If the local government targets a fixed amount of tax revenue, then lower tax rates can be imposed on communities with higher home values. Secondly, \(Y_t\), \(i\), and other factors are hard to control for. For example, \(Y_t\) is associated with the quality of local public services, monetary policies, inflation, and public expectations (Poterba, 1984). All these factors are hard to fully identify. The literature has pointed out that, when property taxes are used to finance local public services like in the US, higher tax rate is associated with higher \(P\) by improving the quality of public goods (Rosen and Fullerton, 1977). To avoid biases arising from these endogeneity problems, some authors use natural experiments derived from exogenous policy changes (for example, Rosen, 1982). Nonetheless, even if changes in \(\tau\) are exogenous, it remains challenging to fully control for \(Y_t\), for \(i\), and for other factors.

This paper estimates the influence of property taxes on home prices, taking advantage of a property-tax experiment implemented in China at the end of January 2011, in two cities only—Shanghai and Chongqing. Unlike many other countries, there has been no property taxes in China until then. Thus, in addition to having an exogenous change in \(\tau\), our study offers several advantages. Firstly, since property taxes have not been a major source of Chinese governments’ tax revenue and are not used...
to finance local public goods, it avoids a standard bias in this literature that higher property taxes are associated with better public goods. Secondly and most importantly, we can use home prices in other cities/provinces to control for potential changes in $Y_t$, in $i$, and in other factors for Shanghai and Chongqing, instead of identifying variations in each factor. In particular, we estimate hypothetical home prices in the absence of property taxes in the treatment group using home prices in the control group, compare hypothetical prices with actual prices, to identify the treatment effect of the property-tax experiment.

This approach, motivated by Hsiao et al. (hereafter HCW) (2012), is different from the conventional difference-in-difference (DID) approach. Firstly, the DID assumes there is no sample selection effect, but HCW’s method does not require this assumption. Secondly, HCW allows for more flexibilities in the estimation. To see this, suppose $Y_t$ changes before and after the policy experiment. The DID approach assumes the treatment and control groups share exactly the same change in $Y_t$, as well as bear the same influence, so that taking differences has it removed. These can hardly apply to local home-price variations in China. Suppose that, an expansionary fiscal policy drives up home prices in all cities like the 2008 China Fiscal Stimulus Plan. It is possible that home prices rise by more in Shanghai than in Jiangsu or vice versa because, in China, local governments’ economic powers vary so that their responses to macro policies also vary. Failure to incorporate such regional heterogeneity can falsely attribute home-price changes driven by other factors to the property-tax experiment, creating biases on the estimators.

Instead, our approach focuses on the correlation pattern between the treatment group and control group before the policy intervention. Hence, it allows for the impact of underlying factors to vary by city/province. Also, our approach puts more weight on control cities/provinces more relevant to the treatment cities, unlike the DID approach that assigns the same weight to each control-group member. For example, Jiangsu, as a neighborhood province of Shanghai, gets more weight than Heilongjiang when both serving as control provinces for Shanghai. These details are carefully presented in an econometric model in Section 2. The model extends from HCW (2012) without relying on a key assumption (i.e., no need of HCW’s Assumption 6). We show that, as long as the price series are non-stationary, the OLS assumption (i.e., no need of HCW’s Assumption 6). We show that the synthetic control method suggested by Abadie et al. (2010) to analyze the property tax effects on housing price. However, the synthetic control method is computationally more demanding. Also, our experience suggests that the synthetic control method often lead to similar estimation result as HCW (2012) method. Therefore, we will focus on using HCW (2012) method in this paper. The rest of the paper is organized as follows. Section 2 lays out the econometric model. Section 3 describes the data. The estimation results are discussed in Section 4. Section 5 explores the potential spillover effect in Chongqing. We conclude the paper in Section 6.

2 The Shanghai and Chongqing governments use the proper-tax revenue to finance the construction of subsidized rental houses for the poor. Since these houses are at the very low end of housing supply and therefore are poor substitutes for commercial housing, this should not influence the value of commercial housing and thus cannot bias our estimates.

3 See the 8th annual demographia international housing affordability survey published by the Wendell Cox Consultancy (Cox and Pavletich, 2012). A ratio below 3.0 is considered as “affordable” and that above 5.1 is “severely unaffordable”. This ratio ranges from 2.7 to 3.1 for the US.
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