Economics Bulletin

Volume 45, Issue 1

Linking the dots: Housing prices and crime rates across Chinese provinces

Andy Cheng
The Hang Seng University of Hong Kong

Tsun Se Cheong
The Hang Seng University of Hong Kong

Michal Wojewodzki
Lingnan University

Abstract

China has witnessed unprecedented economic growth and urbanisation while soaring housing prices and crime rates have become a burning issue. However, the research on the effect of Chinese housing prices on crime remains limited and ignores the endogeneity problem. This study covers all Chinese provinces from 2000 to 2015. By employing the two-step system generalised method of moments, we examine the association between housing prices and crime rates, addressing the endogeneity. We document a significant positive effect of the crime rate on housing prices. Furthermore, we report that economic growth and educational attainment negatively affect criminal activities. The results substantiate strain, disorganisation, and deterrence theories.

No funding was received to assist with preparing this manuscript. The authors report no competing interests to declare. The data supporting this study's findings are available from the corresponding author upon reasonable request.
Citation: Andy Cheng and Tsun Se Cheong and Michal Wojewodzki, (2025) "Linking the dots: Housing prices and crime rates across Chinese provinces", *Economics Bulletin*, Volume 45, Issue 1, pages 544-554
Contact: Andy Cheng - andycheng@hsu.edu.hk, Tsun Se Cheong - jamescheong@hsu.edu.hk, Michal Wojewodzki - michalwojewodzki2@ln.edu.hk.
Submitted: February 06, 2024. **Published:** March 30, 2025.

1. Introduction

Crime has long been one of the focal social malaises in China, placing pressure on the central and local governments to increase their focus on crime prevention (Song et al., 2020). Crime containment is vital to maintaining safety and social stability (De Puiseau et al., 2019). Notwithstanding, according to the National Bureau of Statistics of China, registered criminal cases nearly doubled during 15 years (2000-2015), as in Figure 1.

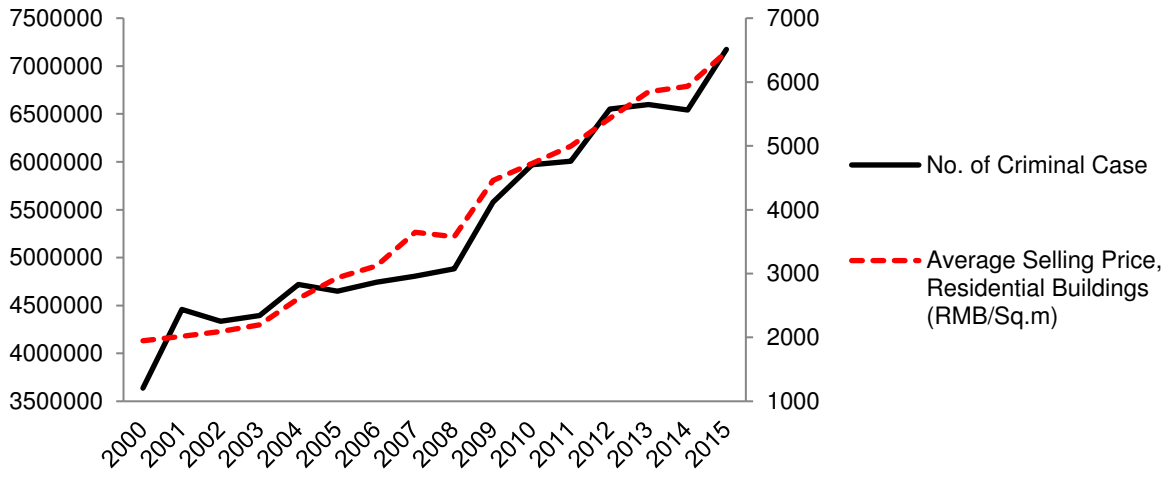

Figure 1 Criminal Cases and Housing Prices (2000-2016)

Source: National Bureau of Statistics of China and authors' compilation

Over the same period, China has witnessed an unprecedented urbanisation process, while soaring housing prices have become a significant issue (see Figure 1). Additionally, many people cannot afford a flat in urban China, while many houses remain unoccupied (Liu et al., 2022). Given the above, the Central Economic Work Conference held in Beijing in 2015 identified the management of housing prices as a significant challenge for provincial governments.

The direct and indirect costs associated with crime are tremendous, while increased injuries and higher mortality rates are only some of the direct consequences of crime (Soares, 2015). Social waste is also associated with crime, e.g., the value of goods lost and destroyed, medical expenditures, subjective costs of pain and suffering, and private and public expenditures on criminal justice programs and security (Cheong and Wu, 2015). The strain theory (Merton, 1938) proposes that people consider criminal behaviour to achieve goals unachievable through legal means. In social disorganisation theory, Shaw and McKay (1942) argue that individuals commit crimes when factors weaken social control mechanisms, such as poverty and residential mobility. In the economic theory of crime, known as deterrence theory, Becker (1968) and Ehrlich (1973) suggest that individuals allocate time between market and

criminal activity by comparing the expected return (utility) from both concerning the probability and degree of punishment associated with the latter.

The widespread and intuitive consensus is that crime deleteriously influences the housing market. There is ample empirical research on the association between crime and housing prices. However, most of the studies examine the effect of criminal activities on property values focusing on various parts of the US (e.g., Ihlanfel and Mayock, 2010; Boggessa et al., 2013) and Western countries (e.g., Buonanno et al., 2013). For instance, Linden and Rockoff (2008) document a significant negative effect of ex-sex criminals moving into the neighbourhood on the local property prices in the US. Using a dataset of 3000 urban zip codes across the US, Pope and Pope (2012) argue that crime is a neighbourhood disamenity; thus, its decrease (increase) leads to significant growth (reduction) in housing prices. Buonanno et al. (2013) document that increased perceived security is associated with increased property valuation in Barcelona (Spain), while substantial discounts in housing values characterise less safe city districts. Relatively rare Chinese studies corroborate the negative correlation between crime rates and property prices (e.g., Geng et al., 2015).

However, to the best of our knowledge, the research examining the reverse direction effect, i.e., of housing prices on crime in China, remains limited to just a few studies. Song et al. (2019) use ordinary least squares (hereafter OLS) and fixed effects (hereafter FE) models to find that residential housing prices positively correlate with local criminal activities across 28 Chinese provinces. They argue that this can be explained by continuously raising property prices, making purchasing a flat unachievable through legal means (as per strain theory), and increasing the prospective utility derived from crime endeavours to afford it (in line with deterrence theory). Song et al. (2020) also employ the FE method and document that the more expensive the provincial housing market, the larger the crime rate in that province. Song and Hao (2022) corroborate the above findings using the FE estimator and report that raising housing prices in one region can affect criminal cases in the adjacent areas of China.

Such a gap in the literature is puzzling, given that the crime problem in China appears to be escorted by the ever-increasing housing prices (see Figure 1). Thus, the research question of whether and how soaring housing prices influence crime in China requires more empirical scrutiny. Given the above backdrop, this research examines the relationship between crime rate and housing prices. This study's main contributions are threefold. (1) It extends the scant body of empirical literature on the association between property prices and criminal offences, with the latter as an explanatory variable. (2) Unlike prior studies (Song et al., 2019, 2020; Song and Hao, 2022), our analysis is based on data from all (23) Chinese provinces, four municipalities, and five autonomous regions from 2000 to 2015. (3) This research employs a new methodological perspective to analyse the housing prices-crime nexus. Specifically, we address the thorny issue of suspected endogeneity in econometric models of crime rate (e.g., Ihlanfel and Mayock, 2010) by employing the two-step system generalised method of moments

(hereafter 2SGMM) by Blundell and Bond (1998). This study's findings are important from a policy perspective as the benefit from crime reduction can accrue over a long period.

This research proceeds as follows. Sections 2 and 3 discuss the dataset and the empirical methodology. In section 4, we present and discuss the main findings. Finally, Section 5 concludes the research and provides policy implications.

2. Data

As in Cheong and Wu (2015), we use the natural logarithm of authorised arrests per 10,000 people in every province of China as a proxy for the crime rate (*CRIME*) dependent variable. This indicator shows the total number of arrests the office of the People's Procurator has authorised over a year. The data comes from two sources: the Law Yearbook of China and the Procuratorial Yearbook of China. We acquired the data for the remaining variables from the China Statistical Yearbook database. The final dataset is an unbalanced panel covering the 2000-2015 period.

The primary explanatory variable (*HCPI)* reflects housing sector inflation. Furthermore, we include the following set of six control variables in line with prior literature (Cheong and Wu, 2015; Song and Hao, 2022): (1) the percentage of each province's tertiary (services) sector to its gross regional product (*TI*), (2) the percentage of each province's secondary (industrial) sector to its gross regional product (*SI*), (3) provincial consumer price index (*CPI*), (4) The real gross regional product per capita (*GRPPC*), (5) provincial government spending per capita (*GOVEX*), and (6) the number of junior secondary school graduates (*JSEG*). Where applicable, we use constant prices to make the variables comparable across time.

3. Methodology

Following prior relevant studies (e.g., Cheong and Wu, 2015; Song and Hao, 2022), the econometric model of crime rate is presented in equation (1).

$$CRIME_{i,t} = \sum_{k=1}^{7} \beta_k X_{k,it} + \gamma_t + \nu_i + \varepsilon_{i,t} \quad (1)$$

Where $CRIME_{i,t}$ term represents the crime rate for province i in year t, β_k is the coefficient of the parameters to estimate, $X_{i,t}$, stands for the vector of seven independent variables. γ_t captures provincially invariant but time-specific effects proxied by annual dummy variables. ν_i is the time-invariant unobserved fixed effect for province i and $\varepsilon_{i,t}$ is the idiosyncratic disturbance term, potentially heteroskedastic and with a province-specific pattern of serial correlation, but uncorrelated across the provinces (Roodman, 2009).

It is important to note that econometric models of crime rates usually suffer from

endogeneity issues (Cheong and Wu, 2015) due to the inclusion of deterrent factors among explanatory variables. For instance, higher government expenditure (*GOVEX*) can decrease crime, but an increase in the latter rate may also cause higher government spending (e.g., Levitt, 1998). Another source of endogeneity in the models of crime is the suspected simultaneity between the housing prices (*HCPI*) and the crime rate (e.g., Ihlanfel and Mayock, 2010).

To address these challenges, we use the system generalised method of moments (SGMM) estimator, commonly recommended when dealing with the problem of endogeneity and unbalanced panels (Faulkender et al., 2012). It is worth noting that the SGMM estimator offers several advantages, including its applicability to unbalanced panels, handling of multiple endogenous variables, and ability to control for fixed effects and time effects. Blundell and Bond (1998) suggest that using SGMM is particularly beneficial when dealing with nonstationary variables. They demonstrate that the biases resulting from near-unit-root processes can be significantly reduced using Monte Carlo simulations. Furthermore, Blundell and Bond (2000) illustrate the application of SGMM in studying dynamic production functions involving persistent data series. Moreover, this study employs a two-step SGMM (2SGMM) approach to account for heteroskedasticity (Wojewodzki et al., 2020).

Because there is no prior information on the exogeneity of the explanatory factors, we consider all dependent variables to be endogenous. We employ the small-sample corrected standard errors to handle the potential issue of downward bias in standard errors (Windmeijer, 2005). Furthermore, by reducing the number of used instruments' lags to four at most, we address the problem of the proliferation of instrumental variables (Wojewodzki et al., 2018).

The accuracy and reliability of the generalised method of moments (GMM) estimator heavily rely on the appropriateness of using lagged values as instruments. Several tests are available to assess the estimation results. In this study, we employ the Sargan test of over-identifying restrictions, as suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998), to evaluate the validity of the instruments following GMM estimation. This test examines the overall validity of the instruments, with the null hypothesis stating that there is no correlation between the residuals and the instrumental variables. In addition to the Sargan test, the Hansen test assesses over-identifying restrictions. Both tests are employed in this study to ensure the validity of the instruments used in the analysis.

Furthermore, a crucial test to consider is the serial correlation test, specifically the AR(2) test, which investigates the presence of second-order serial correlation in the errors of the transformed equation. It is important to note that the autocorrelation test is conducted on residuals in difference, even when orthogonal deviations are employed during estimation (Roodman, 2009). This test helps to identify any potential serial correlation issues that may affect the reliability of the estimation results.

4. Results and Discussion

To examine the issue of multicollinearity, the explanatory variables from the baseline equation (1) are tested by a variance inflation factor (VIF). All reported VIFs are below 5, while the mean VIF is 2.35. Thus, the results suggest no severe multicollinearity of the functional specification (Hair et al., 2018). Next, the Ramsey RESET linear model test is applied to ensure the model does not suffer from misspecification[1]. The F-statistic and p-value are 1.13 and 0.3361, respectively, which indicates that we cannot reject the null hypothesis of the correct specification (Hair et al., 2018).

In the presence of endogeneity, the estimated results from ordinary least squares (hereafter OLS), fixed effects (hereafter FE), and random effects (hereafter RE) estimators would be biased and potentially false. However, all prior research on China studying housing prices (crime) as an independent (dependent) variable uses one of the three problematic methods to conduct econometric analysis (Song et al., 2019, 2020; Song and Hao, 2022). Given the above backdrop, this study emphasises mitigating the endogeneity issue by employing the 2SGMM estimator.

For robustness, transparency, and comparability with extant literature purposes, Table 1 shows the results for the OLS, FE, and RE estimation methods in columns (1), (2), and (3), respectively. We can observe that the estimated coefficient on the primary independent variable (*HCPI*) variable in columns (1) to (3) equals 0.02 but is statistically significant only in the model based on the RE method. The size of the coefficient is very much in line with the results documented by Song et al. (2020) and Song and Hao (2022), who use the FE estimators and find that, on average, a one percentage point increase in housing price is associated with 0.20 to 0.22 percentage point increase in crime rate[2].

Table 1 Housing prices and crime rates

	(1)	**(2)**	**(3)**	**(4)**
Model	**OLS**	**FE**	**RE**	**2SGMM**
Variable				
HCPI	0.002	0.002	0.002**	0.015**
SI	0.001	-0.001	0.001	-0.016**
TI	0.000	-0.002	0.000	-0.018**
JSEG	-0.267*	-0.237	-0.267**	-1.060*
GRPPC	0.000	0.000*	0.000	0.000*
CPI	-0.005	-0.003	-0.005	0.021
GOVEX	0.124	0.102	0.124	-0.734
No. of observations	247	247	247	247

[1] For brevity, the VIFs and Ramsey RESET test results are not reported but are available upon request.
[2] As a proxy for crime rate, Song et al. (2020) and Song and Hao (2022) use the natural logarithm of criminal cases prosecuted per 100 thousand people.

Period of estimation	2000-2015	2000-2015	2000-2015	2000-2015
R^2		0.050	0.069	
Year Dummies	Yes	Yes	Yes	Yes
Provincial Dummies	Yes	No	Yes	Yes
AR(2) Z-statistic				0.172
Hansen's test p-value				0.118

Notes: *, **, and *** denote coefficients' statistical significance at the 10%, 5%, and 1% levels. The dependent variable is a natural logarithm of authorised arrests per 10,000 people (CRIME). In all models, we use asymptotic heteroskedasticity-robust (in the 2SGMM model only, also small sample-corrected) standard errors clustered by the provinces.

Next, we discuss the estimation output based on the 2SGMM estimation method in column (4) of Table 1. We can observe that the AR(2) and Hansen validation tests indicate no second-order autocorrelation in the residuals and that the instruments used in the model are valid, respectively. Unlike the estimated output in columns (1) to (3), five out of seven of the estimated coefficients are statistically significant in column (4), corresponding to the 2SGMM model. Specifically, the estimated coefficient on the *HCPI* variable in column (4) is statistically significant at a 5 per cent level and equal to 0.015. This means that holding all else constant, we would expect, on average, a one percentage point increase in the housing price to be associated with a 1.51 percentage point increase in the crime rate. While such a positive relationship aligns with prior studies on China (Song et al., 2019, 2020; Song and Hao, 2022), the estimated housing price effect from the 2SGMM method is roughly seven times larger than in columns (1) to (3) and in previous research using the FE method (Song et al., 2020). Thus, we can conclude that accounting for the suspected endogeneity significantly affects the results.

This study fills a gap in the literature by examining the unique dynamics of housing prices and crime rates in China, a rapidly urbanising and developing country. The reported results starkly contrast with studies on developed regions such as the U.S. and Europe, where crime is typically found to lower property values (e.g., Linden and Rockoff, 2008; Buonanno et al., 2013; Wilhelmsson and Ceccato, 2015). This divergence reflects the unique socio-economic pressures in China, such as widespread housing affordability challenges and rapid urban migration, which may intensify strain-induced criminal behaviour. Moreover, China's unique context, characterised by state-driven urbanisation and a housing market highly intertwined with cultural and financial aspirations, differs significantly from other developing countries, suggesting limited generalizability.

The documented positive association between the crime rate and housing prices substantiate the strain theory by demonstrating how soaring housing prices may compel individuals, particularly those from disadvantaged socio-economic backgrounds, to engage in criminal activity to achieve the unattainable goal of housing ownership. This aligns with the theory's prediction that societal pressures can drive deviant behaviour. The findings also expand social disorganisation theory by emphasising how economic factors, such as housing

unaffordability, exacerbate crime rates. Elevated housing prices may weaken community cohesion, particularly in rapidly urbanising areas, reducing social control mechanisms. This extends the theory's application by highlighting housing economics as a contextual factor influencing social order.

Table 1 also shows that the coefficients on *SI* and *TI* terms in column (4) are statistically significant at a 5 per cent level and carry negative signs. These results indicate a decreasing effect of economic growth on crime in China under the 2SGMM specification. The secondary and tertiary sectors play essential roles in China's economic development, including better employment opportunities for migrant workers from rural areas (Cheong and Wu, 2015). Furthermore, being employed increases the opportunity cost for committing the crime compared to the possible gain (Fajnzylber et al., 2002). In addition, for people with jobs in the services and industrial sectors, incarceration means absence from (and difficulty in returning to) the labour market, which is a deterrent to breaking the law (Lochner and Moretti, 2004). Therefore, the findings align with the deterrence theory.

Regarding the relationship between educational levels and crime rate, the coefficient on *JSEG* is statistically significant (albeit only at the lowest 10 per cent level) and negative. Many studies (Lochner and Moretti, 2004; Fella and Gallipoli, 2014) report similar findings. An increase in education may alter individual rates of time preference and increase their patience and risk aversion. Moreover, schooling may affect people's cognition of crime by directly affecting the perception of criminal activities, decreasing the willingness/tolerance to engage in crime (Lochner and Moretti, 2004). The result also implies that improving human capital accumulation through a better education system effectively reduces crime.

5. Conclusions

This research examines the link between housing prices and the crime rate in China. We use the 2SGMM model and document that soaring housing prices significantly increase the crime rate in China, which corroborates with economic theories. Furthermore, the estimated effect is around sevenfold in magnitude compared to previous studies. The results also indicate that economic growth is negatively associated with criminal activities. Finally, we report a decreasing effect of educational attainment on the crime rate, aligning with the human capital-based theory of crime (Lochner and Moretti, 2004).

The analysis presented in this research is the first attempt to estimate the impact of housing price level on crime rate by applying provincial data covering the whole of China and addressing the previously neglected endogeneity issue. Understanding the mass effect of crime reduction is essential from a policy perspective when planning for urban growth with rising housing prices and prioritising crime prevention. Our findings indicate that a multifaceted approach integrating housing affordability, economic development, and crime prevention

strategies could effectively combat the housing crime nexus identified in this study. For instance, Chinese policymakers should consider implementing subsidised housing for low-income groups or rent control measures to alleviate housing cost pressures and reduce crime-inducing socio-economic strains. Successful examples from other countries provide valuable lessons. For instance, Singapore's Housing and Development Board (HDB) offers affordable public housing while fostering community cohesion and reducing social disorganisation contributing to crime. Similarly, rent stabilisation programs in cities like Berlin and New York have mitigated housing costs, though they require careful design to avoid unintended market distortions. At the same time, promoting educational attainment through scholarships, vocational training, and community-based programs can improve employment prospects and deter criminal activity. Additionally, boosting economic growth by fostering investment in the industrial and services sectors can create job opportunities and reduce the economic incentives for crime. Adapting such policies to the Chinese context would require tailoring them to local economic and demographic conditions, such as rapid urbanisation and regional disparities.

We acknowledge several limitations of this study. First, while the dataset covers a comprehensive range of provinces in China from 2000 to 2015, it may not fully account for regional heterogeneity or changes in socio-economic dynamics beyond this period. Second, relying on official crime and housing data could introduce potential biases due to underreporting or regional disparities in data collection practices. Although the GMM approach is well-suited for addressing endogeneity and unbalanced panels, it has been criticised as a "black box", where results can appear robust but are sensitive to user-defined options, such as the number of lags and instrument specifications.

While this research demonstrates a robust, significant positive association, the GMM methodology does not imply causality. Likewise, we do not know whether the entire effect is direct or mediated by variables such as social inequality or unemployment. Therefore, investigating the causal mechanisms and mediating factors in the association between housing prices and crime in China is justified. Furthermore, China's state-driven urbanisation and unique housing market tied to cultural and financial aspirations limit the study's generalizability to other developing countries. Thus, future research with multi-country analysis is warranted. This would offer valuable insights into how varying economic and social conditions influence the relationship between housing prices and crime.

References

Arellano, M., and Bond, S. (1991) "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations" *Review of Economic Studies* **58**, 277-297.

Arellano, M., and Bover, O. (1995) "Another look at the instrumental-variable estimation of

error-components models" *Journal of Econometrics* **68**, 29-51.

Becker, G.S. (1968) "Crime and punishment: An economic approach" *Journal of Political Economy* **76**, 169-217.

Blundell, R., and Bond, S. (1998) "Initial conditions and moment restrictions in dynamic panel data models" *Journal of Econometrics* **87**, 115-143.

Blundell, R., and Bond, S. (2000) "GMM Estimation with persistent panel data: an application to production functions" *Econometric Reviews* **19**, 321-340.

Boggessa, L.N., Greenbaumb, R.T., and Titac, G.E. (2013) "Does crime drive housing sales? Evidence from Los Angeles" *Journal of Crime and Justice* **36**, 299-318.

Buonanno, P., Montolio, D., and Raya-Vilchez, J.M. (2013) "Housing prices and crime perception" *Empirical Economics* **45**, 305-321.

Cheong, T.S., and Wu, Y. (2015) "Crime rates and inequality: a study of crime in contemporary China" *Journal of the Asia Pacific Economy* **20**, 202-223.

De Puiseau, B., Glöckner, A., and Towfigh, E. (2019) "Integrating theories of law obedience: How utility-theoretic factors, legitimacy, and lack of self-control influence decisions to commit low-level crimes" *Judgment and Decision Making* **14**, 318-334.

Ehrlich, I. (1973) "Participation in illegitimate activities: A theoretical and empirical investigation" *Journal of Political Economy* **81**, 521-565.

Faulkender, M., Flannery, M.J., Hankins, K., and Smith, J.M. (2012) "Cash flows and leverage adjustments" *Journal of Financial Economics* **103**, 632-646.

Fajnzylber, P., Lederman, D., and Loayza, N. (2002) "What causes violent crime?" *European Economic Review* **46**, 1323-1357.

Fella, G., and Gallipoli, G. (2014) "Education and crime over the life cycle" *The Review of Economic Studies* **81**, 1484-1517.

Geng, B., Bao, H., and Liang, Y. (2015) "A study of the effect of a high-speed rail station on spatial variations in housing price based on the hedonic model" *Habitat International* **49**, 333-339.

Hair, J., Black, W., Babin, B., Anderson, R. (2018) "Multivariate Data Analysis" (8th ed). Cengage Learning.

Ihlanfel, K., and Mayock, T. (2010) "Panel data estimates the effects of different types of crime on housing prices" *Regional Science and Urban Economics* **40**, 161-172.

Levitt, S.D. (1998) "Juvenile crime and punishment" *Journal of Political Economy* **106**, 1156-1185.

Linden, L., and Rockoff, J.F. (2008) "Estimates of the impact of crime risk on property values from Megan's Laws" *American Economic Review* **98**, 1103-1127.

Liu, X., Yu, J., Cheong, T.S., and Wojewodzki, M. (2022) "The future evolution of housing price-to-income ratio in 171 Chinese cities" *Annals of Economics and Finance* **23**, 159-196.

Lochner, L., and Moretti, E. (2004) “The effect of education on crime: Evidence from prison inmates, arrests, and self-reports” *American Economic Review* **94**, 155-189.

Merton, R. (1938) “Social structure and anomie” *American Sociological Review* **3**, 672-682.

Pope, J.C., and Pope, D.G. (2012) „Crime and property values: Evidence from the 1990s crime drop” *Regional Science and Urban Economics* **42**, 177-188.

Roodman, D. (2009) “How to do Xtabond2: An introduction to difference and system GMM in Stata” *The Stata Journal* **9**, 86-136.

Shaw, C., and McKay, H. (1942) “Juvenile delinquency and urban areas” University of Chicago Press.

Soares, R.R. (2015) “Welfare costs of crime and common violence” *Journal of Economic Studies* **42**, 117-137.

Song, Z., and Hao, C. (2022). Housing price and criminal crime in China: Direct and indirect influence, Applied Economics, 54(40), 4647-4663.

Song, Z., Yan, T., and Jiang, T. (2019) “Can the rise in housing prices lead to crime? An empirical assessment of China” *International Journal of Law, Crime and Justice* **59**, 100341.

Song, Z., Yan, T., and Jiang, T. (2020) “Poverty aversion or inequality aversion? The influencing factors of crime in China” *Journal of Applied Economics* **23**, 679-708.

Wilhelmsson, M., and Ceccato, V. (2015) “Does burglary affect property prices in a nonmetropolitan municipality?” *Journal of Rural Studies* **39**, 210–218.

Windmeijer, F. (2005) “A finite sample correction for the variance of linear efficient two-step GMM estimators” *Journal of Econometrics* **126**, 25-51.

Wojewodzki, M., Boateng, A., and Brahma, S. (2020) “Credit rating, banks' capital structure and speed of adjustment: a cross-country analysis” *Journal of International Financial Markets, Institutions and Money* **69**, 101260.

Wojewodzki, M., Poon, W., and Shen, J. (2018) “The role of credit ratings on capital structure and its speed of adjustment: an international study” *European Journal of Finance* **24**, 735-760.