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Public Security Expenditure, Education Investment, and Social Stability: An Empirical Analysis Based on Provincial Panel Data from China

Zongyi YIN¹, Canhua KANG², Long WANG³, Deqiang GENG⁴, Zhuang XIONG⁵

Abstract

Public security expenditure is a financial means for maintaining social stability and can significantly inhibit growth in crime rate. However, the role of education investment in this relationship and the existence of regional heterogeneity have been neglected in existing studies. To explore the effects of public security expenditure and education investment on social stability, the provincial panel data of 31 provinces in China from 2007–2015 were examined, and the fixed-effect model was employed to analyze the relationship between public security expenditure, education investment, and social stability. Results show that public security expenditure and education investment have a significant negative effect on crime rate, and social stability can be enhanced by increasing public security expenditure and education investment. The social stabilizing effects of public security expenditure and education investment are more significant in areas with high sex ratio and low urbanization level. Additionally, crime can be more effectively curbed and social stability more effectively maintained by complementing public security expenditure with education investment. This study reveals the impact of regional heterogeneity on the social stabilizing effects of public security expenditure and education investment, as well as the coupling mechanism between them. The conclusions obtained in the study provide a theoretical basis and reference for formulating fiscal policies for public security.

Keywords: public security expenditure; education investment; social stability; crime rate; fixed-effect model.

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Introduction

Social stability is the foundation of economic and social development. In order to maintain public security and social order, government has provided corresponding public security services. The relationship between government investment capacity for public security and social stability needs can, to a certain extent, be reflected by the resulting public security expenditure (Huang & Zhang, 2014). Currently, China has been in a crucial period of economic structural adjustment and deepening reforms, and various types of social conflicts have become increasingly prominent. One of the most important features of these social conflicts is the increase in crime rate. According to the theory of criminal economics, crime rate is closely related to public security situation and further affects the development of the social economy (Eide, 2000). The statistics on the absolute indicator of criminal cases and the relative indicator of crime rate (Zhang, Liu & Liu, 2011; Chen & Yi, 2009) show that the number of criminal offenses in China has been increased year by year from 2007 to 2015 (*Figure 1*). Specifically, the number has been increased from 4.808 million in 2007 to 7.174 million in 2015, with a mean annual growth rate of 4.55%. The number of criminal cases and the scale of the crime rate show a certain convergence with economic growth. In addition, China's public security expenditure has also risen yearly, boasting an average annual growth rate of 11.63%, which greatly exceeds the mean annual growth rate of criminal offenses. Although the government fiscal expenditure has played a social stabilizing role in this matter to a certain extent, there is still room for further improvement in the performance of public security. Especially during the current social transition period, the potential incentives affecting social stability are complex and changeable. While the factors causing social instability are being controlled and eliminated by public security expenditure, figuring out how to further curb the increase in criminal offenses and crime rate through the synergy of policies has become the key to promoting the rapid and steady development of the economy and building a harmonious society.

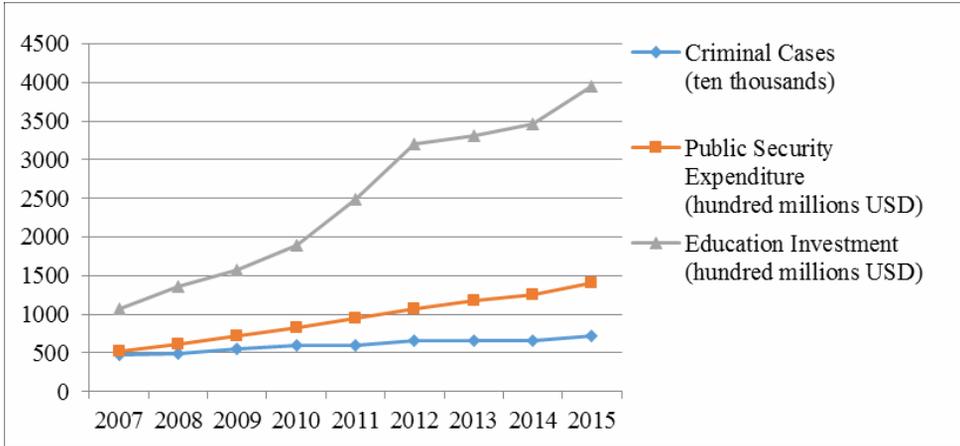


Figure 1. Increasing trends in China’s public security expenditure, education investment, and criminal cases (2007–2015)

Data sources: Law Yearbook of China and China Statistical Yearbook (2008–2016)

Public security expenditure plays a certain role in promoting social stability, and the change of its can be used to predict social stability trends (Huang & Zhang, 2015). Increased education investment has also exerted a significant impact on improving China’s public security situation during the transition period (Chen, 2012). However, the coupling mechanism of public security expenditure and education investment to social stability needs to be further analyzed with consideration of constraints by the government’s fiscal budget and regional differences in income, unemployment, urbanization level, sex ratio, and population density. Therefore, this study addresses two research questions: (1) How significant are the respective effects of public security expenditure and education investment on crime rate reduction? (2) Does regional heterogeneity cause differences in the effects on social stability? For these two questions, the effects of public security expenditure and education investment on social stability were empirically verified by using the provincial panel data of 31 provinces in China from 2007-2015. In this way, the study attempts to reveal the coupling mechanism, marginal effect, and heterogeneity, so as to realize the optimal effect of fiscal expenditure on crime control and social stability through the reasonable arrangement of public security expenditure and the education investment budget. The rest of this study is constructed as follows: Section 2 consists of a literature review. Section 3 presents the modeling methodology, including the construction of the research model and the design of variables, as well as the descriptive statistical analysis. The results of the empirical analysis are presented in Section 4. Section 5 discusses the results, while Section 6 concludes the study.

Literature Review

Existing studies on the relationships of public security expenditure, crime rate with social stability are abundant with fruitful results. Becker (1968) argued that increased judiciary expenditure played a significant role in crime reduction and served as a deterrent to crimes that had not been committed. Levitt & Miles (2007) empirically verified the causal relationship between judiciary expenditure and crime rate by using instrumental variables. In evaluating the supply efficiency of local public security services, Gong (2008) found that the government's public security investment in small and medium-sized cities was insufficient, while the investment in big cities was excessive. In addition, a causal relationship was found between public security investment and economic growth (Glass, 2009), and the former had a positive impact on curbing the crime rate and promoting social stability, showing a long-term balanced relationship (Huang & Zhang, 2014). With increasing public security investment, the fiscal burden of economically underdeveloped areas was heavier than that of economically developed areas, resulting low social stabilizing efficiency for local government (Shambaugh, 2000). In most of these studies, the impact of public security expenditure on crime or social stability was analyzed macroscopically, but the heterogeneous impact of regional differences was neglected.

The quality of citizens can be improved through education, thereby lowering the crime rate and enhancing social stability. Buonanno & Leonida (2009) found a significant negative correlation between education and crime rate. Strengthening citizens' moral education, law-related education, and humanistic education played an active role in the isolation of crimes and moral constraints (Zhang, Lv & Wang, 2014). Using an optimal scaling regression method, Cui (2010) analyzed the negative correlation between the education level and punishment level of criminals with the optimal scaling regression approach and found that education had a deterrent effect and a negative effect on criminal activities, and the state and society could obtain non-monetary benefits through investment in education. These findings showed that the crime rate could, to a certain extent, be suppressed by education investment, thereby maintaining social stability.

Income inequality is another factor that affects crime rate. MacCulloch (2004) analyzed the impact of GDP per capita on the tendency of society to support change, which to a certain extent reflected the relationship between income per capita and social stability. A study by Kennedy, Kawachi, Prothrow-Stith, Lochner, & Gupta (1998) also showed that there was a strong correlation between income inequality and gunshot violence; in particular, income inequality had a strong and robust effect on violent crimes (Kelly, 2000). Tsushima (1996) explored the impacts of poverty, income inequality, and unemployment on crime and found that income inequality was positively correlated with theft, unemployment was significantly and positively correlated with murder and burglary, while poverty

was only significantly and positively correlated with murder. Hu, Hu & Xu (2005) found a close correlation between the widening of the income gap and the increase in criminal activity. They noted that the gradual narrowing of the gap between the rich and the poor was an important means of minimizing illegal and criminal activities and promoting the building of a harmonious society. Chen & Yi (2009) used panel data to empirically analyze the causal relationship between income inequality and criminal behavior. They found that whenever the relative income gap was increased by 1%, crime rate would be significantly increased by 0.37%, and a 1% rise in absolute income gap would result in a significant increase in crime rate by 0.38%. Another study found that the incentives to participate in criminal activities were strengthened by the widening of the income gap (Chen & Shi, 2011). Meanwhile, an empirical study by Zhang et al. (2011) showed that the impact of the widening of the income gap between urban areas and rural areas on the growth of the crime rate was insignificant, but the crime rate was greatly increased by growth in the unemployment rate of migrant workers.

The social stability issues in China's transition period have also received research attention. With the accelerated development of urbanization in China, the problem of social crimes is becoming increasingly severe. Urban problems had become a hotbed for the birth, occurrence, and development of urban crime (Wang, 2008). Survey data showed that China was facing a serious challenge in the synchronous growth of urbanization level and crime rate (Yang, 2013), and the root lay in the severe absence of procedural justice and result justice during China's pseudo-urbanization. In addition, the unbalanced sex ratio was an important factor contributing to the rising crime rate in China during the transition period (Hudson & Den Boer, 2002). From the perspective of equalization, fiscal transfer payment would also affect the supply of public goods and promote the equalization effect of public security product supply between regions (Boadway & Shah, 2007), thereby resolving the uneven allocation of public security resources between regions (Dafflon & Vaillancourt, 2003).

As shown in the above analysis, the effects of public security expenditure, education, income inequality, and urbanization on crime control and social stability have been studied from the perspective of economics, and fruitful results have been obtained. However, there are still some shortcomings: the factors affecting social stability have mainly been studied from a single perspective, such as fiscal expenditure or education investment, lacking of in-depth analysis on the coupling mechanism that affects social stability under the effect of multiple factors. In addition, most existing studies have focused on the national level, and the existence of regional heterogeneity has been neglected. Therefore, the possible contributions of this study are as follows: First, based on the existing theories, the relationships of public security expenditure, education investment with social stability are analyzed, and the marginal effects of the two factors on social stability are empirically verified by data. Second, focusing on the micro level, provincial

panel data are used to analyze the social stabilizing effects of public security expenditure, education investment and the complementarity between them in the presence of regional heterogeneity.

Method, Data and Variables

Method

Social stability is a social phenomenon that can be observed but cannot be quantified. In this study, crime rate was selected as the proxy variable of social stability according to the method proposed by Huang & Zhang (2015). Further, the possible impacts of factors such as the sample's heteroscedasticity and autocorrelation were taken into account, and panel data were used for empirical econometric analysis. In addition, while attention to the impacts of public security expenditure and education investment on social stability was paid. Meanwhile, based on existing literature, national income per capita, the registered unemployment rate of the urban population, regional population density, urbanization rate, and male/female sex ratios were taken as the model's control variables. Hence, the following regression model was established:

$$Crimer_{i,t} = \beta_1 Safe_{i,t} + \beta_2 Pedu_{i,t} + \lambda \sum Control_{i,t} + u_i + \varepsilon_{i,t} \quad (1)$$

where i and t represent the provincial area and time of year ($i = 1, 2, \dots, 31$; $t = 2007, 2008, \dots, 2015$), respectively $Crimer_{i,t}$ represents the explained variable, which is the number of criminal offenses committed per 10,000 people; $Safe_{i,t}$ and $Pedu_{i,t}$ represent explanatory variables, which are public security expenditure per capita and education investment per capita; $\sum Control_{i,t}$ represents a sequence of control variables, including national income per capita ($Pgdp$), registered unemployment rate of urban population ($Unempl$), regional population density ($Pden$), urbanization rate ($Cityra$), and male/female sex ratio ($Sexra$); u_i is an unobservable random variable that represents the intercept term of heterogeneity in different regions; $\varepsilon_{i,t}$ represents a disturbance term that changes with individual and time. Due to the heterogeneity among provincial regions, $\varepsilon_{i,t}$ reflects the impact of other unobservable random factors across the regions on crime rate. According to Den Boer & Hudson (2004), there is no correlation among random factors. Therefore, it was assumed that disturbance term $\varepsilon_{i,t}$ was independently and identically distributed and irrelevant to.

Data and Definition of Variables

In this study, the provincial panel data of 31 provinces in China from 2007–2015 were collected. There were a total of 279 samples and 2,232 observation values. The areas excluded in the panel data were Hong Kong, Macau, and Taiwan, as data from these regions were unavailable. The above data were obtained from the *China Statistical Yearbook*, *Finance Yearbook of China*, and *Law Yearbook of China* from 2008–2016. For the purpose of the study, China was divided into six regions according to the normal division method: North China (Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia), Northeast China (Liaoning, Jilin, and Heilongjiang), East China (Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, and Shandong), South Central China (Henan, Hubei, Hunan, Guangdong, Guangxi, and Hainan), Southwest China (Chongqing, Sichuan, Guizhou, Yunnan, and Tibet) and Northwest China (Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang). Samples were categorized according to urbanization level and male/female sex ratio. *Table 1* shows the definitions of the variables used in the analysis.

Table 1. Definitions of variables

Variable	Definition	Calculation formula or explanation
<i>Crimer</i>	The number of criminal offenses per 10,000 people	Total criminal offenses/total population
<i>Safe</i>	Public security expenditure per capita	Total public security expenditure/total population
<i>Pedu</i>	Education investment per capita	Total education investment/total population
<i>Pgdp</i>	Income per capita	Total GDP/total population
<i>Unempl</i>	Registered unemployment rate of urban population	Number of registered unemployed people in urban areas/total urban population
<i>Pden</i>	Population density	Total population/administrative division area
<i>Cityra</i>	Urbanization rate	Total urban population/total population
<i>Sexra</i>	Sex ratio	Total male population/total female population
<i>Cityhl</i>	Urbanization level	Urbanization rate greater than 0.6 is set to 1, and less than 0.6 is set to 0
<i>Gender</i>	Gender composition	Sex ratio greater than 1 is set to 1, and less than 1 is set to 0
<i>Region</i>	Region, value set to 1–6	North China, Northeast China, East China, South Central China, Southwest China, Northwest China

Criminal offense rate (*Crimer*). According to the method proposed by Huang & Zhang (2015), crime rate was selected as the proxy variable to measure social stability. Crime rate refers to the number of criminal offenses committed per 10,000 people within a provincial area, that is, the ratio of the total number of criminal offenses to the total population (10,000). The indicator is negatively correlated with social stability (Becker, 1968; Levitt & Miles, 2007), that is, the smaller the indicator, the more stable the society is, and vice versa.

Public security expenditure per capita (*Safe*). Public security expenditure refers to the fiscal expenditure by government on the maintenance of public security. Studies have shown that there is a long-term balanced relationship between public

security expenditure and public security conditions, and public security expenditure is the main factor affecting social stability (Huang & Zhang, 2015). However, due to the differences in economic development and regional environment among different provinces, the technical effects and scale effects of public security expenditure on social stability are not the same (Xie & Dang, 2013; Shi & Zhang, 2015).

Education investment per capita (*Pedu*). Citizens' education level has an appreciable impact on their public security needs (Lu & Jia, 2011). The fiscal expenditure on education investment to a certain extent reflects the importance attached by the state and local governments to citizens' education, and ultimately decides citizens' education level. It is generally believed that higher education levels among citizens reflect higher personal quality, thereby lowering the probability of committing crimes (Han & Zhang, 2015). Therefore, education investment per capita can affect the crime rate by affecting the education level of citizens.

Income per capita (*Pgdp*). Income per capita in different regions is an important indicator in measuring the regional income gap. The widening of the income gap and the polarization between the rich and the poor leads to a series of negative social and economic impacts, and the deterioration of public security status is one of the most important results (Ram, 2009). According to Chen & Yi (2009), income level is an important factor affecting crime rate, and the widening of the income gap strengthens the public's intrinsic motivation to engage in criminal activities.

Registered unemployment rate of urban population (*Unempl*). Studies have shown that the expected profits of actors in the legal market are lowered by the unemployment rate (Chen & Chen, 2010). The unemployed will seek opportunities to survive through various means, resulting in many types of social instability. The rise of the registered unemployment rate in the urban population has a positive effect on crime rate (Huang & Zhang, 2014).

Population density (*Pden*). Population density refers to the ratio of the total population in a region to the regional area. It reflects the relative population in a region. In addition, criminal offenses are more likely to take place in densely populated regions, and then increasing social instabilities (Edlund, Li, Yi & Zhang, 2007).

Urbanization rate (*Cityra*). In this study, urbanization rate is defined as the ratio of urban population to total population. A study by Wan (2007) found that there was a significant positive relationship between urbanization rate and criminal offense rate, with an increasing urbanization rate leading to the growth of the crime rate.

Male/female sex ratio (*Sexra*). Public security is affected by sex ratio and marriage status. Crimes are more likely to be committed in areas where the sex

ratio is unbalanced, especially where the male population is much greater than the female population (Lu & Jia, 2011). Therefore, sex ratio was taken as an important variable affecting social stability in this study.

Moreover, in consideration of regional heterogeneity, three dummy variables - region (*Region*), urbanization level (*Cityhl*), and gender composition (*Gender*) - were introduced in the model and discussed respectively. *Region* was set to 1-6, representing six geographic regions, namely North China, Northeast China, East China, South Central China, Southwest China, and Northwest China; *Cityhl* was set to 0 or 1. When $Cityhl \geq 60\%$, it was set to 1; otherwise, it was set to 0. *Gender* was set to 0 or 1. When $Sexra > 1$, *Gender* was set to 1. When $Sexra \leq 1$, *Gender* was set to 0.

Descriptive Statistical Analysis

The descriptive statistical analysis results are shown in *Table 2*. It can be seen that the mean number of criminal offenses committed by per 10,000 people nationwide is 7.6, the maximum is 33.6, and the annual crime rates in different provincial regions vary. Additionally, public security expenditure per capita increased year by year in 31 provincial areas. In terms of education investment, the standard deviation of education investment per capita was 115.3 USD, which indicated a serious imbalance of education investment and great differences in citizen quality among different provincial regions.

Table 2. Descriptive statistics of major variables

Variable	Mean	Standard deviation	Minimum	Maximum
<i>Crimer</i>	7.6	3.9	2.2	33.6
<i>Safe</i>	73.6	54.2	16.1	479.6
<i>Pedu</i>	201.5	115.3	48.0	777.1
<i>Pgdp</i>	10	0.56	9	12
<i>Unempl</i>	3.5	0.64	1.2	4.6
<i>Pden</i>	636	748	37	3827
<i>Cityra</i>	0.48	0.17	0.22	0.9
<i>Sexra</i>	1.1	0.57	0.99	10

Source: Data were calculated by the authors

Regional heterogeneity is embodied by differences in characteristics such as income per capita, the registered unemployment rate of the urban population, population density, urbanization rate, and male/female sex ratio. These differences influence the crime rate of a region to some extent and thereby affect social stability. According to the statistics, from 2007 to 2015, the regions with the highest criminal offense rate (14.32) were Zhejiang, and the lowest rate (4.14) found in Tibet.

It can be seen from *Figure 2* that the mean crime rates in North China, Northwest China, and East China are relatively high based on the criminal offense

rate, public security expenditure per capita, and education investment per capita, reaching more than 8. Moreover, the public security expenditure per capita of different regions varies greatly. The public security expenditure per capita of East China, the region with the highest crime rate, is only 66.3 USD, which is lower than that of Southwest China, the region with the lowest crime rate. However, the education investment per capita has a greater influence on crime rate variability. Southwest China has the highest education investment per capita and the lowest crime rate, while North China has the second highest education investment per capita and the highest crime rate. According to the descriptive statistical analysis, there is no strong cointegration relationship among public security expenditure, education investment, and crime rate (which represents the social stability). These results demonstrate the existence of regional heterogeneity in each provincial region.

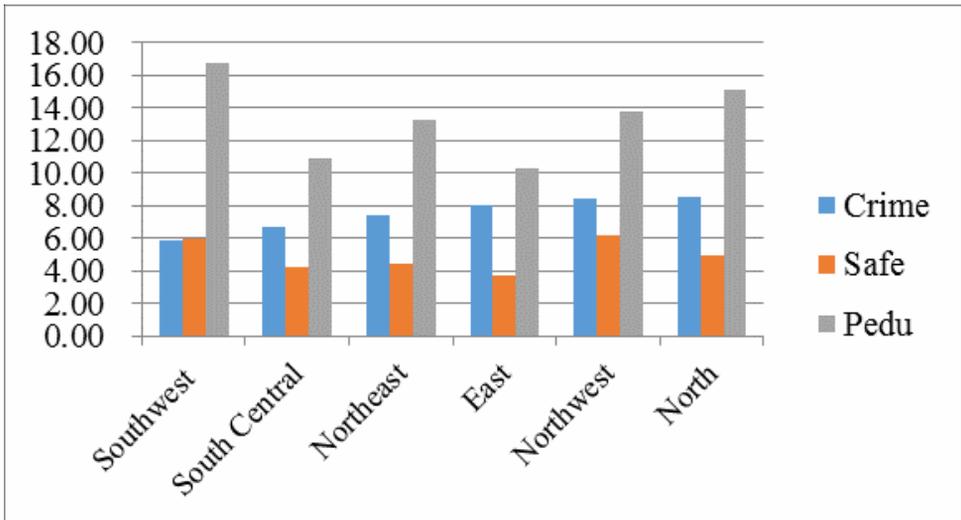


Figure 2. Regional distribution of crime rate, public security expenditure, and education investment

Result Analysis

Model Selection

An analysis of the selection of an applicable model was carried out by using panel data. Based on the method proposed by Wooldridge (2010), it was first assumed that the data satisfied the classical assumptions, and a simple OLS regression was carried on the sample data. The effects of public security expenditure and education investment on social stability were assessed for the overall situation, which was regarded as a reference. Then, the fixed effect model and random effect model were used to analyze the data, and the analysis results of the two models were compared. Finally, the model with better analysis results was determined by the Hausman test and the Sargan–Hansen test. After adding a variety of control variables, the estimated results of the above three regression models were compiled in *Table 3*.

Table 3. Comparison on the estimation results of the three regression models

	Mixed effect	Fixed effect	Random effect
<i>Safe</i>	-0.002 (0.003)	-0.005*** (0.002)	-0.003* (0.002)
<i>Pedu</i>	-0.002 (0.002)	-0.004*** (0.001)	-0.002*** (0.001)
<i>Pgdp</i>	2.309 (1.982)	-0.455 (1.486)	1.356 (1.013)
<i>Unempl</i>	0.596 (0.659)	0.386 (0.804)	0.572 (0.552)
<i>Pden</i>	0.000 (0.000)	-0.009*** (0.002)	-0.001 (0.001)
<i>Citra</i>	1.250 (5.256)	3.956 (8.781)	4.218 (3.407)
<i>Sexra</i>	-0.048 (0.120)	-0.119 (0.301)	-0.117 (0.307)
<i>_cons</i>	-20.789 (17.250)	12.274 (14.124)	-11.687 (9.776)
<i>Control</i>	Yes	Yes	Yes
N	279	279	279

Note: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$; the numbers in parentheses are standard errors (*S.E.*).

According to the regression results of the three models, the coefficients of public security expenditure (*Safe*) and education investment (*Pedu*) in the fixed effect model are -0.005 and -0.004, respectively ($p < 0.01$). In the random effect model, the coefficient of education investment *Pedu* is -0.002 ($p < 0.01$), while the coefficient of public security expenditure *Safe* is -0.003 ($p < 0.1$). This shows that public security expenditure and education investment have negative impacts on crime rate, and increasing these factors can significantly reduce the crime rate

and thus promote the social stability. However, in the mixed-effect model of simple OLS regression, the coefficients of variables *Safe* and *Pedu* are not significant, indicating that this model cannot be reliably used for regression when there is heterogeneity in provincial regions.

After adding variables, the model was compared with the mixed regression by using the simple OLS method. In the fixed effect model, $\tilde{\eta} = 0.8835$, which is close to 1, suggesting that the fixed effect of provincial regions is relatively strong. Moreover, $p = 0.000$, indicating that the fixed effect is significant at the level of 1%, so the original mixed effect hypothesis is strongly rejected. In other words, the fixed effect model is significantly better than the mixed effect model. Meanwhile, due to the existence of regional heterogeneity, each region should be allowed to have an independent intercept item u_i . Since $\sigma = 0.5966$ and $\rho = 0.3637$ in the random effect model, the random effect does exist in provincial regions, but it is not strong. In the Lagrange Multiplier (LM) test, $p = 0.000$, indicating that the random effect is weak but significant at the level of 1%, which further suggests that the original hypothesis that there is no individual random effect should be strongly rejected. That is to say, the random effect model is significantly better than the mixed effect model. The above analysis shows that both the fixed effect model and the random effect model are better than the mixed regression model, and the applicable model can be determined between the fixed effect model and the random effect model.

Therefore, the Hausman test and Sargan-Hansen test were carried out on the fixed effect model and the random effect model, respectively. The p -values of the two tests were 0.001 and 0.008, respectively; hence, the original hypothesis of the existence of a random effect was strongly rejected. Therefore, the fixed effect model was selected, and there was no over-recognition. The fixed effect regression model was used in this study to empirically analyze the impact of public security expenditure and education investment on social stability.

The regression results of the fixed effect model show that the coefficients of public security expenditure (*Safe*) and education investment (*Pedu*) are -0.005 and -0.004, respectively ($p < 0.01$). It is indicated that when other factors remain unchanged, for every 1% increase in public security expenditure per capita, the number of criminal offenses per 10,000 people is significantly reduced by 0.005%, while every 1% increase in education investment per capita can significantly reduce the number of criminal offenses per 10,000 people by 0.004%.

Classification of Regression Results

The group test results of the regions are shown in *Table 4*. After controlling the per capita income, registered unemployment rate of the urban population, population density, urbanization level, and sex ratio, the coefficients of public security expenditure (*Safe*) in North China and South China are -0.011 and -0.012, respectively ($p < 0.01$). The influence effect of public security expenditure in Northwest China is only significant at the level of 10%, which is lower than the significance levels of other regions. The coefficient of education investment (*Pedu*) in Northwest China is -0.010 ($p < 0.01$); in Southwest China, public security expenditure (*Safe*) and education investment (*Pedu*) are not significant. The above results prove the existence of provincial regional heterogeneity and show that it can lead to the different effects of public security expenditure and education investment on crime rate.

Table 4. Sub-regional estimation results

	North China	Northeast China	East China	South Central China	Southwest China	Northwest China
<i>Safe</i>	-0.011*** (0.003)	-0.009* (0.007)	-0.012*** (0.002)	-0.005** (0.002)	0.000 (0.001)	-0.005** (0.002)
<i>Pedu</i>	-0.005* (0.003)	-0.005** (0.002)	-0.007** (0.003)	-0.003** (0.001)	0.000 (0.001)	-0.010*** (0.003)
<i>Pgdp</i>	0.453 (12.476)	-0.263 (5.760)	-1.266 (3.049)	-1.303 (1.050)	3.051* (1.642)	-9.814 (7.836)
<i>Unempl</i>	1.440 (4.804)	0.634 (2.044)	0.731 (1.992)	1.148** (0.446)	1.574* (0.893)	0.715 (3.170)
<i>Pden</i>	-0.011 (0.020)	0.199 (0.284)	-0.009 (0.008)	0.002** (0.001)	-0.006* (0.003)	-0.027*** (0.005)
<i>Cityra</i>	23.056 (69.931)	31.230 (26.302)	-8.858 (20.786)	-4.303 (4.024)	-5.012 (12.698)	0.341 (66.651)
<i>Sexra</i>	16.776 (31.692)	-21.754 (43.157)	-8.458 (21.676)	28.933 (31.740)	-41.855 (25.771)	-0.080 (0.378)
_cons	-21.392 (104.983)	-21.918 (90.692)	36.791 (35.078)	-19.348 (37.440)	18.315 (29.839)	108.118* (57.092)
Control	Yes	Yes	Yes	Yes	Yes	Yes
N	45	27	63	54	45	45

Note: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$; the numbers in parentheses are standard errors (S.E.).

The results of the regression analysis of groups divided by sex ratio and urbanization level are shown in *Table 5*. The results suggest that the coefficient of public security expenditure in provincial regions with a high sex ratio is -0.005 ($p < 0.05$) at the level of 5%, and the coefficient of education investment is -0.004 ($p < 0.04$) at the level of 1%. For provincial regions with a lower sex ratio, the effect is not significant, which indicates that increasing public security expenditure and

education investment in regions with a high sex ratio can effectively lower crime rate. In addition, in provincial regions with lower urbanization levels, the coefficients of public security expenditure (*Safe*) and education investment (*Pedu*) are -0.006 and -0.005, respectively, at the level of 1%. Therefore, increasing public security expenditure and education investment has a significant effect on restraining crime, but the effect is not significant in regions with high urbanization levels. Although increasing public security expenditure and education investment can reduce crime rate, the above results show that considerable differences will be demonstrated under the different conditions of sex ratio and urbanization level.

Table 5. Estimation results by sex ratio regression and by urbanization level regression

	Sex ratio		Urbanization level	
	High	Low	High	Low
<i>Safe</i>	-0.005** (0.002)	-0.050 (.)	-0.014 (0.013)	-0.006*** (0.002)
<i>Pedu</i>	-0.004*** (0.001)	0.000 (.)	-0.001 (0.004)	-0.005*** (0.001)
<i>Pgdp</i>	-0.505 (1.527)	17.742 (.)	12.838 (10.591)	-1.829 (1.392)
<i>Unempl</i>	0.363 (0.826)	0.032 (.)	2.237 (3.741)	0.057 (0.816)
<i>Pden</i>	-0.010*** (0.002)	0.008 (.)	-0.004 (0.011)	-0.009*** (0.002)
<i>Cutyra</i>	5.432 (9.132)	0.000 (.)	-30.226 (64.494)	5.019 (8.299)
<i>Sexra</i>	-0.119 (0.305)	0.000 (.)	7.574 (29.011)	-0.102 (0.258)
_cons	12.087 (14.522)	-176.390 (.)	-112.040 (93.274)	25.166* (13.482)
Control	Yes	Yes	Yes	Yes
N	272	7	53	226

Note: *p < 0.1, **p < 0.05, and ***p < 0.01; the numbers in parentheses are standard errors (S.E.).

Robustness Test

Different provincial regions differ in economic development levels, employment and unemployment rates, social welfare, transfer payments, and population migration. In the fixed effect model regression estimation, these differences were not taken into consideration. Therefore, there could be some missing variables and autocorrelation problems. However, for a short panel with only a nine-year period, the autocorrelation problem can be ignored. Therefore, to verify the reliability of the results, intra-group estimation and cluster-robust standard errors were used to test the estimations, and the robustness analysis results are shown in Tables 6 and 7.

Table 6. Robustness test of regional estimation results

	North China	Northeast China	East China	South central China	Southwest China	Northwest China
<i>Safe</i>	-0.012*** (0.004)	-0.001** (0.005)	-0.012** (0.006)	-0.005** (0.002)	0.000 (0.000)	-0.005*** (0.001)
<i>Pedu</i>	-0.007** (0.005)	-0.001** (0.002)	-0.007** (0.005)	-0.003** (0.001)	0.000 (0.001)	-0.010*** (0.002)
<i>Pgdp</i>	-1.266 (1.197)	-0.263 (5.186)	-1.266 (1.197)	-1.303** (0.505)	3.051 (2.218)	-9.814 (7.940)
<i>Unempl</i>	0.731 (1.195)	0.634 (0.738)	0.731 (1.195)	1.148* (0.565)	1.574 (0.920)	0.715 (1.683)
<i>Pden</i>	-0.009* (0.004)	0.199 (0.085)	-0.009* (0.004)	0.002* (0.001)	-0.006 (0.003)	-0.027*** (0.003)
<i>Cityra</i>	-8.858 (9.152)	31.230 (12.939)	-8.858 (9.152)	-4.303 (2.482)	-5.012 (22.705)	0.341 (51.634)
<i>Sexra</i>	-8.458 (13.300)	-21.754 (31.718)	-8.458 (13.300)	28.933 (17.106)	-41.855 (30.104)	-0.080 (0.076)
<i>_cons</i>	36.791 (23.988)	-21.918 (60.319)	36.791 (23.988)	-19.348 (19.151)	18.315 (38.394)	108.118 (54.840)
Control	Yes	Yes	Yes	Yes	Yes	Yes
N	45	27	63	54	45	45

Note: *p < 0.1, **p < 0.05, and ***p < 0.01; the numbers in parentheses are standard errors (S.E.).

Compared with the analysis results in Table 4, there was almost no change in the estimated value and significance of variable *Safe* in intra-block estimation and cluster-robust standard error (Table 6), except in Northeast China. The negative effect of the variable on the crime rate in Northeast China was weakened (from -0.009 to 0.001), and the significance level increased to 5%. There was no change in the regression coefficients or significance of variable *Pedu* in East China, South China, Southwest China, or Northwest China, but the coefficient of *Pedu* in North China changed to -0.007, and the coefficient of *Pedu* in Northeast China changed to -0.001.

Table 7. Robustness test of regression estimation results

Variable	FE robustness test	Based on sex ratio		Based on urbanization level	
		High	Low	High	Low
<i>Safe</i>	-0.005** (0.002)	-0.005** (0.002)	-0.050 (.)	-0.014*** (0.003)	-0.006*** (0.002)
<i>Pedu</i>	-0.004*** (0.002)	-0.004** (0.002)	-0.000 (.)	-0.001 (0.001)	-0.005** (0.002)
<i>Pgdp</i>	-0.455 (1.717)	-0.505 (1.778)	17.742 (.)	12.838** (3.551)	-1.829 (2.035)
<i>Unempl</i>	0.386 (0.539)	0.363 (0.564)	0.032 (.)	2.237** (0.880)	0.057 (0.406)
<i>Pden</i>	-0.009 (0.007)	-0.010 (0.008)	0.008 (.)	-0.004 (0.005)	-0.009 (0.008)
<i>Cityra</i>	3.956 (7.329)	5.432 (7.954)	0.000 (.)	-30.226 (35.328)	5.019 (6.347)
<i>Sexra</i>	-0.119*** (0.028)	-0.119*** (0.029)	0.000 (.)	7.574 (6.192)	-0.102*** (0.025)
_cons	12.274 (18.345)	12.087 (18.568)	-176.390 (.)	-112.040** (33.576)	25.166 (20.169)
Control	Yes	Yes	Yes	Yes	Yes
N	279	272	7	53	226

Note: *p < 0.1, **p < 0.05, and ***p < 0.01; the numbers in parentheses are standard errors (S.E.).

The results of Table 7 suggest that with robust standard error, there is no change in the estimated values or symbols of variables *Safe* and *Pedu*. The significance level of variable remains 1%, but that of variable *Safe* declined from 1% to 5%, which nevertheless still passed the robustness test with a 95% degree of confidence.

In addition, other control variables *Province*, *Region*, *Gender*, and *Cityhl* were added to analyze the effect of public security expenditure and education investment on crime rate. The analysis results are shown in Table 8. After controlling variables *Province*, *Region*, *Gender*, and *Cityhl*, the estimated values of public security expenditure and education investment under each item are shown in columns (1)-(4). As the results show, both the coefficients and symbols of the variables *Safe* and *Pedu* remain the same, and most of them are significant at the level of 5%. This again demonstrates the positive effect of public security expenditure and education investment on social stability, that is, increased public security expenditure and education investment by the government can significantly reduce the crime rate and enhance social stability.

Table 8. Impacts of public security expenditure and education investment on social stability: fixed effect model

	(1)	(2)	(3)	(4)
	<i>Crimer</i>	<i>Crimer</i>	<i>Crimer</i>	<i>Crimer</i>
<i>Safe</i>	-0.005** (0.002)	-0.005** (0.002)	-0.005** (0.002)	-0.005** (0.002)
<i>Pedu</i>	-0.004* (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004* (0.002)
<i>_cons</i>	12.27 (18.35)	12.27 (18.35)	12.36 (18.29)	12.45 (18.18)
<i>Control</i>	Yes	Yes	Yes	Yes
<i>Province</i>	Yes	No	No	No
<i>Region</i>	No	Yes	No	No
<i>Gender</i>	No	No	Yes	No
<i>Cityhl</i>	No	No	No	Yes
<i>N</i>	279	279	279	279

Note: *p < 0.1, **p < 0.05, and ***p < 0.01; the numbers in parentheses are standard errors (S.E.).

Discussion

The above empirical results indicate that, as important parts of government financial expenditure, public security expenditure and education investment have negative effects on crime rate. By increasing public security expenditure and education investment, crimes can be restrained and social stability can be maintained. However, due to the existence of regional heterogeneity, the effects can vary.

First, the analysis results in Table 3 and the robust standard error test results in Table 8 are combined, and with other factors unchanged, for every 1% increase in public security expenditure per capita, the number of criminal offenses per 10,000 people is significantly reduced by 0.005% for every 1% increase in public security expenditure per capita. Meanwhile, every 1% increase in education investment per capita can significantly reduce the number of criminal offenses per 10,000 people by 0.004%. This shows that increasing public security expenditure and education investment can improve social stability, the result aligns with the findings of Becker (1968). Public security expenditure is an important financial resource of public security investment. The financial increase of public security expenditure increases the investment on maintaining public security. It plays an important role in preventing and reducing crime, and it effectively reduces criminal offense rates and improves social stability. Meanwhile, increased education investment can significantly improve citizen quality, which enhances individuals' resistance to criminal activity and increases the marginal opportunity cost of crime so as to reduce crime rate and improve public security. Therefore, to

strengthen the ability of government fiscal expenditure on maintaining social stability, the fiscal bias that is ignoring public service and emphasizing infrastructure construction should be changed, and the proportion of the budget in public security and education should be increased in a timely and moderate manner, which will give play to the effects of the finance on social stability.

Second, according to the analysis results in *Table 4* and *Table 6*, the negative effect of public security expenditure on social stability is significant in North China and East China, and less significant in Northeast China, and even less significant in Southwest China. In addition, the negative effect of education investment on social stability is relatively high in Northwest China and relatively low in Southwest China. This is likely due to the fact that unemployment rate was increased because of slow and even declined economic growth in Southwest China recently. Additionally, the marginal effect of public security expenditure on crime rate is slightly lower than in other regions. Due to the remote location of Southwest China and its relatively backward economic level, low social welfare, and low transfer payment level, a large amount of population migration and brain drain inevitably occurs. Therefore, the marginal effect of public security expenditure and education investment on crime rate is weakened, which is consistent with the findings of Xie & Dang (2013). It can be seen that there are clear regional differences in the effects of public security expenditure and education investment on the maintenance of social stability, further suggesting that differentiated and targeted public security expenditure and education investment policies are required. Therefore, the government should consider the impact of regional differences and reasonably arrange public security expenditure and education investment according to regional differences. In addition, the government should ensure that public security expenditure and education expenditure are focused on less developed inland provinces by establishing a standardized financial transfer payment system. Therefore, the government can improve the public security and education expenditure levels of these regions and ultimately attain greater social stability and effectively reduce crime rate.

Third, the results in *Table 5* and *Table 7* suggest that even though increased public security expenditure and education investment can both reduce crime levels, there are considerable differences under different sex ratio and urbanization level conditions. For regions with high sex ratios, the effect of public security expenditure and education investment on reducing crime rate is significant, and the significance level of education investment is higher. However, in regions with low sex ratios, the effect is not as significant, which is consistent with the findings of Hudson & Den Boer (2002). This indicates that in China, where the proportion of men and women is imbalanced and sex discrimination exists, the social stabilizing effect of education investment is more significant. It also shows that the effect of public security expenditure and education investment on reducing crime rate is complementary with the sex ratio. Furthermore, in regions with low

urbanization levels, public security expenditure and education investment can significantly improve social stability, but in regions with lower urbanization levels, their effects are not significant. Therefore, the sex ratio and urbanization level of a region should be taken into consideration when the government determines its financial budget. When implementing public security and education investment in regions with higher sex ratios, the proportion of education investment should be increased moderately. Education investment should also be more focused on remote mountain areas and other regions with relatively low urbanization levels. The education funds should primarily be invested in elementary education to develop vocational education and training, cultivate talents and strengthen employment service. Through the reasonable allocation of educational resources, citizen quality can be improved. Thus, even with limited financial resources, the social stabilizing effect of public security and the education financial expenditure can be made more effective.

Conclusion

In this study, the provincial panel data of 31 provinces in China from 2007–2015 were used to empirically analyze the effects of public security expenditure and education investment on social stability. Moreover, the differential influences of regional heterogeneity on the social stabilizing effects of public security expenditure and education investment were examined based on region, urbanization level, and sex ratio. The following conclusions were drawn:

(1) Public security expenditure and education investment have a significant negative impact on crime rate, that is, social stability can be improved by public security expenditure and education investment. (2) Due to the influence of location conditions, the marginal effects of public security expenditure and education investment on social stability vary significantly. (3) The social stabilizing effects of public security expenditure and education investment are more significant in areas with high sex ratios and low urbanization levels. Therefore, we argue that the social stabilizing effect of education investment should be fully considered when the budget of public security expenditure is being formulated. In addition, crimes can be more effectively curbed by complementing public security expenditure with education investment based on regional differences so as to achieve an ideal crime control effect and maintain public security.

The conclusions of this study can guide the government to reasonably allocate the public security expenditure and education investment budgets, and can be served as a theoretical and practical basis for formulating effective public security fiscal policy. However, there are some limitations to this study. For example, although panel data were used, only nine years' worth of data was collected due to the lack of statistical data and other objective factors, so the overall sample size

is small. Future studies can focus on the following issues: (1) With consideration of whether social welfare expenditure and transfer expenditure have substitution effects with public security expenditure and education investment, the influences of social welfare expenditure and transfer expenditure on curbing crime and maintaining social stability should be explored and discussed. (2) With the deepening of the transformation of China's social structure, attention should be paid to population migration and the left-behind population, and the impact on social stability exerted by new problems arising from social change should be further considered.

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