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Impact of rural capital outflow on sustainable economic growth: evidence from Shaanxi Province of China

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ABSTRACT

The capital constraint and underinvestment faced by rural residents are the pivotal factors limiting economic growth. The rural capital outflow further magnifies the income gap between urban and rural residents, seriously undermining rural areas' capital accumulation and sustainable development. For this purpose, we perform a theoretical and empirical investigation of the impact of rural capital outflow on economic growth. The results reveal that rural capital outflow occupies investment opportunities for rural economic development that adversely affect economic growth. Secondly, rural economic growth has an inertial effect and generates path dependence on capital outflow. The calculation of rural capital outflow in northern Shaanxi, Guanzhong, and southern Shaanxi regions of China reveals that capital outflow in northern Shaanxi is insignificant and shows signs of capital return, while southern Shaanxi and Guanzhong emerge as key regions for capital outflow. Policymakers must adhere to long-term initiatives to reform and refine multi-level capital markets that support agricultural development in rural areas and build a sound rural financial market order for sustainable economic growth.

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1. Introduction

Since the reform and opening up, factor flows between various regions in China have evolved from being dominated by government plans to being independently regulated by the market, whereby the invisible hand has boosted production factor flows (Y. Li et al., 2022; Khalid et al., 2022; Ren et al., 2022). Considering regional economic growth, capital flows undoubtedly have a major role in sustainable economic growth owing to resource reallocation through capital consolidation (Duodu & Baidoo, 2022; Shi et al., 2022; Wan et al., 2022; Zhuang et al., 2023).

As the economy continuously expands, the Chinese capital market develops continuously and refines (Hao et al., 2022; Xiao & Liu, 2022; Yao et al., 2021). Capital

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flows among regions become increasingly usual and speedy. The variation in resource allocation effects accompanying its flow will have an important influence on the economic development of various regions (Razzaq et al., 2021; Zhang & Qian, 2022). Nonetheless, Chinese regional economic growth has exhibited differentiation because of historical and geographic differences among regions, with club convergence at both provincial and municipal levels (Gu & Wang, 2022). The lack of mobility between regions with different levels of growth and their long-term internal consolidation is not conducive to collaborative regional economic development. Especially in rural areas, such trends are more evident (Khan et al., 2022; Levy & Bustamante, 2022; Song et al., 2022). One of the major bottlenecks constraining rural economic development is the relatively lagging development of rural finance and the continuous flow of large amounts of capital from rural to urban areas through various channels (Ma & Chen, 2022; Razzaq & Yang, 2023).

Consequently, in a bid to boost rural economic development, many developing countries, such as China, are endeavouring to strengthen the supply of rural finance and increase the construction of inclusive finance to capture more capital flows to rural areas (Chen et al., 2022; Liao et al., 2022). This is significant for providing financial support to agricultural development and sustainable economic growth in rural areas. The deposit-to-credit ratio of rural credit cooperatives in developed eastern regions of China is 67% in 2017, while the deposit-to-credit ratio in less developed central and western regions is even lower at 37.8%, indicating that rural credit capital is flowing out, and the outflow of capital is more severely problematic in less developed regions (Cao et al., 2022; Sheng, 2021).

Rather than relying solely on policy support and transfusion assistance, the government fully utilises the potential of rural areas and farmers to turn transfusion into birth production to accelerate the pace of rural economic development and enable rural areas to become appealing markets (Carillo & Jappelli, 2022). Rural residents are limited in yield expansion due to fiscal constraints and production funding gaps (Tang & Sun, 2022). Further, the scarcity of rural capital is the primary direct cause of the financial constraints and underinvestment rural residents face (Guo, 2022). In addition, urban-rural development imbalance and the contradiction between supply and demand of capital are currently relatively prominent, which made it difficult for fully market-based financial resource allocation to direct capital flows to rural areas, yet exacerbated rural capital outflow from less developed areas. The paradox of capital flow also reflects the deficiencies of the current rural investment and financing system (Matthews et al., 2022; Sini et al., 2022). Capital outflow constrains the rural economy's development and hinders the supply-side reform of rural finance.

Due to accelerated urbanisation, rural capital continuously flows out and intensifies the trend of transferring to non-agricultural industries. In particular, the outflow of financial resources from less developed districts is not well-controlled, while the trend of capital return is not obvious (Ran et al., 2023; Zhang & Razzaq, 2022). The clearest manifestation of rural regional economic differences should be between county regions. Capital outflow has been a major cause of capital shortage in rural areas at the county level, seriously affecting the realisation of rural revitalisation strategy. Therefore, taking Shaanxi as an example, we investigate the deep-rooted causes and

effects of rural capital outflow on economic growth, which can scientifically optimise rural financial resources allocation and furnish more path options for the government to drive the rural revitalisation strategy. Through the comparative study of counties with different levels of economic development, the pattern of rural capital outflow in various rural counties with different economic characteristics can be further explored. It can seek more scientific policies and methods for capital return and provide countermeasures and suggestions for the high-quality development of the rural economy.

We develop the current study in the following ways. First, we construct a theoretical model of rural capital outflow on sustainable economic growth, which lays the theoretical foundation for subsequent analysis. Second, we describe the capital flows in rural areas, taking Shaanxi as an example, to provide significant clues for mining the driving force of economic growth. Next, we quantitatively analyse the relationship between rural capital flows and economic growth to augment the current study.

2. Literature review

After a wave of financial liberalisation started during the 20th century, the impact of capital flows on economic growth has attracted widespread attention from the scholarly community. However, scholars have not yet reached a unanimous consensus on the effects of capital flows and their mechanism of impact on economic growth (Adam, 2022; Anthony-Orji et al., 2023; Bostan et al., 2023). Reinhart and Reinhart (2009) argue that booms in emerging economies are highly correlated with the influx of capital booms. Houria (2023) argues that capital flows are closely associated with human capital and their preference for regions with sufficient human capital, which generates shocks to economic growth. Dinh Su and Phuc Nguyen (2023) suggest that capital inflows negatively affect low economic growth and positively affect high economic growth. Adams and Klobodu (2018) argue that economic growth in many developing countries is heavily dependent on capital inflows, and their infrastructure development still requires adequate sources of finance. Bussiere and Fratzscher (2007) indicate that the relationship between capital flows and economic growth is dynamic with country characteristics. Aizenman et al. (2013) argue that the types of capital flows are diverse and can exhibit significantly different shocks to economic growth.

Recently studies strongly diverge on the association between rural capital inflows and economic growth. Currently, researchers mainly study the impact of rural capital outflow on rural economic development in terms of financial disincentives and financial deepening (Lei et al., 2022). Canavire and Rioja (2008) argue that financial development is ineffective in alleviating poverty and increasing the poverty incomes of the poor. Huang et al. (2006) identifies that capital outflow from rural to urban areas exists in industrialisation processes in countries worldwide. Tsai (2008) states that the net outflow of capital affects the supply of capital, which raises the price of capital in financial markets. Ağca and Mozumdar (2008) discover that capital outflow from rural areas will be detrimental to the formation of capital investment in rural areas.

Schularick (2006) indicates that the rate of return to capital influences capital outflow. Kalemli et al. (2010) argues that the investment climate influences it. Li and Du (2023) argue that capital flows to rural areas boost the economic development of rural areas by improving their material resources and infrastructure.

From the perspective of capital outflow, scholars have explored the causes of capital outflow intensively (Ağca & Mozumdar, 2008). Some scholars argue that agriculture is ineffective due to factors such as financial support for agriculture and agricultural loans, commercial banking system reform, the weak ability of rural people left behind to increase income, lack of financial knowledge in rural areas, and the large gap between urban and rural infrastructure (Pali et al., 2023; Poulton et al., 2006; Raza et al., 2023; Swinnen & Gow, 1999; Hussian et al., 2022). Wang et al. (2023) and Shen et al. (2022) multi-dimensional perspective confirms that rural capital outflow widens the urban-rural income gap. Regarding capital outflow channels, some scholars believe that rural tax outflow is directly related to financial support for agriculture, the 'price scissors' in industrial and agricultural products, and rural financial institutions (Tang, 2023). However, capital outflow will continue to be curbed with the development of new rural financial institutions, which will greatly help rural revitalisation (Li & Liu, 2023). Regarding capital outflow impact, scholars believe that agricultural capital outflow has been a significant contributor to the slow development of the rural economy and has affected the county economy (Li & Liu, 2023). If financial inclusion only focuses on solving the problem of contact exclusion of financial institutions in poor areas, it will further aggravate the capital outflow and negatively affect poverty alleviation, i.e., there is an obvious poverty-causing effect (Ding et al., 2023; Tang et al., 2023). As the level of financial penetration increases, the financial institutions in poor counties do not play the role of 'blood pumping machines', and the increase in the level of financial penetration in non-poor counties will lead to a significant outflow of financial capital from the county, which damages the effect of poverty alleviation (He et al., 2023; Xue, 2022).

Regarding the impact of rural capital outflow on economic growth, Zhang et al. (2021) argue that the development of rural credit unions has a significant threshold effect on county economic growth. In addition, some scholars point out that different financial policies can cause the development of rural credit unions to have a conditional financial 'curse' effect on county economic growth (Zhu & Wang, 2021). Mo and Shen (2020) draw an interesting point that the increase in the number of local bank branches at the county level enhances the competition in the rural loan market and significantly increases the net inflow of rural credit funds. Zhao and Chen (2018) point out that rural financial outflow from developed and backward rural areas are influenced by different factors such as government spending, the degree of rural marketisation, farmers' income, trade levels, and exchange rates. Cheng (2019) points out that the market-based allocation of financial re- resources will strengthen financial outflow from rural areas.

Comprising the existing literature reveals that current literature on capital flows and economic growth is also relatively rich. Many scholars have also begun to mine the association between capital flows and economic growth from a regional, or rural-urban dichotomy perspective. However, China's regional economic development is

uneven, especially since the regional differences in rural economic development are substantial, making it easy to overlook the differences between regions from a national perspective. Therefore, we choose Shaanxi province, which has typical agricultural characteristics, as the research object to discuss the intrinsic association between capital outflow and economic growth.

3. Theoretical analysis and research hypothesis

A direction of rural capital outflow is moving from rural areas to urban areas, which is more apparent at the county level. Another direction is the transfer between developed and less developed areas. Considering that the objective of this study focuses on Shaanxi Province, China, the impact of rural capital transfer between counties is mainly discussed. The allocation of county-level fiscal funds is an essential force to promote agricultural development, facilitate rural construction, and narrow the gap between urban and rural development, as well as an essential source to fulfil the consumption and production of rural residents (Zhu & Li, 2021; Zhu & Wang, 2021). On the one hand, the loss of county-level fiscal funds reduces the supply of funds for agricultural production and rural construction, slows the development of the rural economy, and inhibits the growth of residents' income (Chen et al., 2020). On the other hand, capital outflow increases the difficulty of obtaining financial services for agricultural production and rural construction, which may be unable to escape the 'poverty trap' (Huang et al., 2006; Zhen et al., 2015).

The continuous completion of infrastructure, industrial structure, and information market construction for an urban area has made them more attractive to capital (Baquero & Santolino, 2022; Duan et al., 2021). The strong attraction of urban construction to capital has further widened the gap between urban and rural economic development (Cheng, 2010). Meanwhile, the widening income gap between urban and rural areas makes the polarised development of residents' investment demand, which makes the capital return gap between the two sides widen. The drain of financial resources at the county level will be further expanded due to the market mechanism and the profit-seeking nature of capital (Zhen et al., 2015). China is a vast country with a distinct urban-rural dual structure, and the profit-seeking nature of capital will cause capital to flow to areas with higher marginal output (Qian et al., 2022). Although the market-oriented reform of rural finance has been deepening, and the number, scale, and types of financial institutions have been improved and enriched to varying degrees, the road to rural financial inclusion is still relatively long (Zhou & Yang, 2023). According to classical economic growth theory, capital, labour, and technology are economic growth's main factors. Therefore, the loss of rural capital affects rural economic growth through two main paths. First, the loss of rural capital directly leads to insufficient funds for rural economic development and construction, resulting in slow rural economic development (Gkartzios et al., 2022). Therefore, the loss of rural capital mainly affects rural economic growth through two paths. Firstly, the loss of rural capital directly leads to insufficient funds for rural economic development and construction, resulting in the slow development of the rural economy (Sherman, 2006). Such an effect is called the direct impact of the loss of

rural funds on the rural economy in this paper. Secondly, the loss of rural capital inhibits rural finance development and hinders financial institutions' role in allocating resources to rural economic construction, indirectly affecting rural economic growth (Agbloyor et al., 2014; Le et al., 2023). Such a role is called the indirect impact of the loss of rural financial funds on the rural economy.

Referring to the theoretical model of endogenous growth and based on the simplest AK model, the following theoretical model is constructed.

Consider a closed economy with no government, producing only one product, which can be used for consumption or investment if it is used for investment. δ is rate depreciation, assuming for simplicity a constant population size, total output is a linear function of the total capital stock:

$$Y_t = AK_t \quad (1)$$

Among A is the marginal rate of capital output, and K is in a broad sense (including human capital, technical knowledge, etc.). The capital accumulation equation is:

$$I_t = K_{t+1} - (1 - \delta)K \quad (2)$$

Among them, I denotes the total investment. In a closed economy with no government, total savings should equal total investment. Since the financial system needs to absorb some resources in the process of converting savings into investments (referring to the situation in this paper, it can be understood as the outflow of funds), it can be assumed that only ϕ . The rate of savings conversion can be converted into an investment so that there are: $I_t = \phi S_t$, of which S_t is the total savings of the period, the total savings rate is:

$$s = \frac{S_t}{Y_t} \quad (3)$$

From this, we can get:

$$I_t = \phi s Y_t \quad (4)$$

Assuming the existence of financial intermediation. If the proportion of savings is lost in the process of financial intermediation, the equation of capital outflow is:

$$L_t = (1 - \phi)S_t \quad (5)$$

Among L_t is the total amount of capital outflow in the period t . According to the above analysis, then $(t + 1)$ period's economic growth rate

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 = \frac{K_{t+1}}{K_t} - 1 = \frac{I_t + (1 - \delta)K_t}{K_t} - 1 = \frac{I_t}{K_t} + (1 - \delta) - 1 = A \frac{I_t}{Y_t} - \delta \quad (6)$$

According to the previous analysis, the time scale is removed, and the following formula is obtained by substituting the formulas 3 and 4:

$$g = A \left(\frac{I}{Y} \right) - \delta = A \phi s - \delta \quad (7)$$

Equation (7) reveals that the rate of economic growth depends on the marginal rate of output A denotes the savings rate. S denotes the conversion rate of savings to investment. ϕ denote the rate of depreciation δ . Other things being equal, the financial system acts as an intermediary, transforming effective savings into investment, and reducing capital outflow. L_t denotes transferring the capital surplus sector to the capital shortage sector can better reduce transaction costs, improve transaction efficiency, and thus better promote economic growth.

From the perspective of savings and investment theory, whether the savings willingness of rural residents, individual households, and urban residents is lower than that of urban residents, the conclusion is the opposite (David et al., 2023). The savings rate of rural residents' funds is very high, so the theory of transforming savings into investment to provide financial support for rural development has not appeared in rural areas of China (Narayan, 2005). The endogenous financial theory is based on the neoclassical economic theory of savings and investment conversion process efficiency and cost (Palley, 1996). It provides theoretical support for the relationship between financial development and rural economic growth in rural areas. The important role of finance is to transform savings into investments in the process of capital accumulation (Li et al., 2022b), so the continuous accumulation of the rural economy in China is inseparable from the development of rural finance (Yu, 2023). Compared with the counties in economically developed areas, the financial resources of the underdeveloped counties in western China are very limited, and it is difficult to meet the needs of their economic development (Yang, 2023; Zhao et al., 2022). In addition, the financial institutions pursue profits under the market mechanism and withdraw funds from economically underdeveloped counties, which makes the financial resources of the economically backward counties in western China more scarce (Li et al., 2022a; Zhu & Wang, 2021). The shortage of financial resources will inevitably lead to difficulty in adjusting the industrial structure, improving the per capita income level, and improving the productivity level in economically underdeveloped counties. Correspondingly, due to more capital inflows in economically developed areas, the level of economic development has been further improved, and the economic development gap between regions has been further widened. It leads to a greater outflow of financial capital from underdeveloped counties, which makes underdeveloped counties poorer and forms a 'vicious circle'. Based on the existing literature, we put forward the following hypotheses to be tested.

Hypothesis 1: Rural capital outflow through financial institutions significantly weakens the endogenous capital accumulation capacity in rural areas and affects local economic development.

Hypothesis 2: There are significant differences in rural capital outflow in different counties and a high correlation between capital outflow and economic development.

4. Study design

4.1. Index selection

4.1.1. Explained variable

The explained variable is the degree of rural economic growth (gdp). It mainly refers to the continuous increase of per capita output (or per capita income) in rural areas within a certain period.

4.1.2. Explanatory variable

The main explanatory variable is a rural capital outflow (outc), which mainly refers to the number of funds flowing out through rural formal financial institutions in a certain period in rural areas. The existing literature not only judges whether deposits in rural areas flow out through the positive and negative of the loan-to-deposit gap but also uses the relative index 'loan-to-deposit ratio' to judge the outflow of funds. We use the 'loan-to-deposit ratio' to analyse the deposit outflow in rural China.

4.1.3. Control variable

To eliminate the disturbance of unobservables on the estimation results, following Liu et al. (2022a), Cheng et al. (2022), and Wu et al. (2021), we choose financial deepening (fina), economic structure (agr), government expenditure indicators (sgov), Population growth (slab), education (sedu), and fixed assets investment (sinv) as the following control variables. The size of total bank loans relative to GDP in each region reflects the local level of financial deepening (fina). The proportion of the output value of the primary industry in the region's GDP reflects the economic structure (agr). Government expenditure indicators (sgov) is the ratio of the government budgetary expenditure to the GDP of the current year, which reflects the number of economic resources concentrated, occupied, and used by the government in a certain period, as well as the resulting economic relations between finance and other economic entities, and reflects the breadth and strength of financial functions. Fixed assets investment (sinv) refers to the ratio of fixed assets investment to the GDP of the current year, which reflects the level of regional investment, and the higher the investment level, the more conducive to promoting regional economic growth (Tang et al., 2021). Population growth (slab) reflects population growth in rural areas, which is relatively higher than that in urban areas, and the higher population growth rate may reduce the level of capital accumulation in rural areas, resulting in slow regional economic growth (Chai et al., 2022; Zhu et al., 2022). Education (sedu) refers to the investment intensity of local financial support for education. According to the amount of per capita distribution, the greater the per capita financial expenditure on education, the higher the level of local human capital investment, which is more conducive to the improvement of per capita output, thus promoting the development of the regional economy. The data used are all derived from direct sample data or indirect data calculated from survey data. The statistical description is revealed in Table 1.

Table 1. Variable definitions and descriptive statistics.

Variables	Number of observations	Average value	Standard deviation	Minimum value	Maximum value
<i>gdp</i>	1377	0.616	0.545	0.242	5.136
<i>outc</i>	1377	0.833	0.574	0.1476	8.982
<i>fin</i>	1377	0.475	0.222	0.006	0.996
<i>agr</i>	1377	0.25	0.129	0.011	0.664
<i>sgov</i>	1377	0.216	0.137	0.312	0.963
<i>slab</i>	1377	0.005	0.013	-0.891	0.119
<i>sin v</i>	1377	25.9	15.56	1.9	68.02
<i>sedu</i>	1377	0.16	0.045	0.053	0.29

Source: authors' own production.

4.2. Model construction

Combining with the characteristics of China's rural financial market, this paper establishes the following model to test the impact of rural capital outflow on rural economic growth:

$$gdp_{it} = \beta_0 + \beta_1 outc_{it} + \beta_2 fina_{it} + \beta_3 X_{it} + u_t + v_t + \varepsilon_{it} \quad (8)$$

Among them, gdp_{it} is an explained variable, reflecting the level of rural economic growth. $outc_{it}$ is the explanatory variable of rural capital outflow. X_{it} is a control variable; u_i and v_i are used for controlling the regional effect and the time effect, respectively. ε_{it} is perturbation terms, are independent and identically distributed.

4.3. Sample selection and data description

Shaanxi Province is a major agricultural province in China, which spans the temperate zone, the warm temperate zone, and the north subtropical zone, with the Loess Plateau in northern Shaanxi, the Guanzhong Plain in the middle, and the Qinba Mountains in the south. The rural economic development of Shaanxi Province is in different stages of economic development from south to north. To better reflect the impact of capital outflow on the economic growth of Shaanxi Province. By collecting and collating the statistical data of the China Statistical Yearbook, Shaanxi Statistical Yearbook, and all counties of 10 prefecture-level cities in Shaanxi Province, we collate the data of 81 sample counties (cities) from 2000 to 2016 as the research sample. The sample range is shown in Table 2.

4.4. Descriptive statistics of county financial capital outflow

Figure 1 shows the county-level financial capital outflow scale in sample counties of Shaanxi Province. The total scale of county-level financial capital outflow in counties under the jurisdiction of Yulin City showed a downward trend from 2008 to 2014, while the total scale of outflow in counties under the jurisdiction of prefecture-level cities showed a rising trend. Among them, the county financial capital outflow scale in Xianyang City is the largest each year. In 2016, it reached about 28.7 billion yuan, while financial capital outflow in Tongchuan City and Yan'an City was the smallest, and the inflow of funds in Yulin City was the largest. The statistical analysis of the

Table 2. Data sample range.

Northern Shaanxi	Yan'an City	Yanchuan, Zichang, Ansai, Zhidan, Ganquan, Fuxian, Luochuan, Huanglong, Huangling, Yichuan and Yanchang
	Yulin City	Shenmu, Fugu, Hengshan, Jingbian, Dingbian, Suide, Mizhi, Jiaxian, Wubao, Qingjian and Zizhou
Guanzhong	Xi'an	Lantian County, Zhouzhi County, Huxian County and Gaoling County
	Xianyangng City	Sanyuan, Jingyang, Gan, Liquan, Yongshou, Bin, Changwu, Xunyi, Chunhua, Wugong and Xingping
	Weinan City	Huaxian, Tongguan, Dali, Heyang, Chengcheng, Pucheng, Baishui, Fuping and Hancheng
	Baoji City	Fengxiang, Qishan, Fufeng, Meixian, Longxian, Qianyang, Linyou, Fengxian and Taibai
	Tongchuan City	Yijun County
Southern Shaanxi	Ankang City	Hanyin, Shiquan, Ningshan, Ziyang, Langao, Pingli, Zhenping, Xunyang and Baihe
	Shangluo City	Luonan County, Danfeng County, Shangnan County, Shanyang County, Zhenan County and Zhashui County
	Hanzhong City	Nanzheng, Chenggu, Yangxian, Xixiang, Mianxian, Ningqiang, Lueyang, Zhenba, Liuba and Foping counties

Source: authors' own production.

scale of financial capital outflow in Shaanxi Province shows that the capital loss in the region is closely related to local economic development. Statistics show that the top ten cities in Shaanxi Province in 2016 are Xi'an, Yulin, Xianyang, Baoji, Weinan, Hanzhong, Yan'an, Ankang, Shangluo, and Tongchuan. Xi'an's per capita GDP ranks first in the province, its industrial institutions, and scientific and technological level are leading in the province, and the attraction of urban areas to capital should be stronger. However, the scale of loss of county financial funds is not the largest, which shows that local county financial institutions are larger and the development of inclusive finance is better. As a resource-based city, Yulin City has a relatively higher demand for capital, and there is no large-scale outflow of rural capital, which is

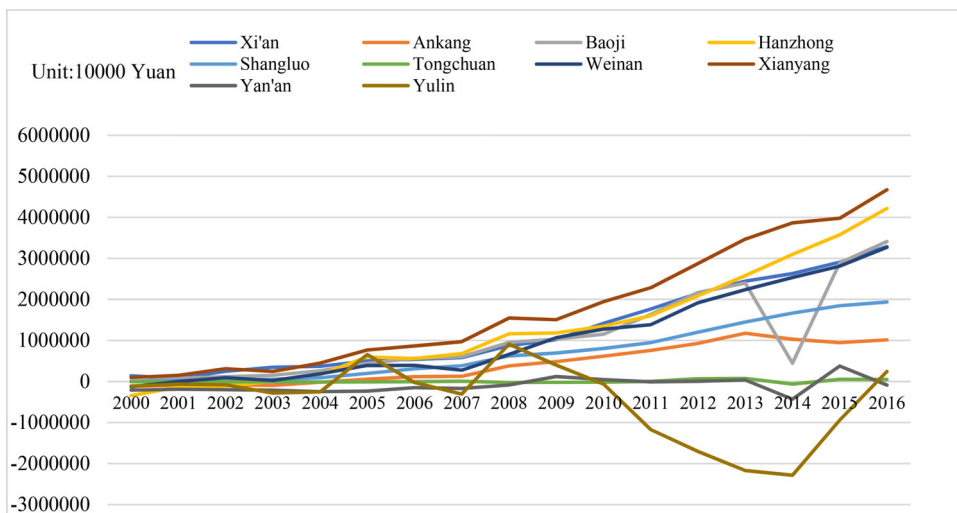


Figure 1. Scale of financial capital loss in sample counties of Shaanxi Province.

Source: authors' own production.

highly consistent with the actual local situation. The loss of rural capital outflow in the county is highly related to the economic growth of the local county.

Figure 2 shows the scale of financial capital outflow in the three regions of Shaanxi Province (Northern Shaanxi, Guanzhong, and Southern Shaanxi). The capital outflow in Southern Shaanxi and Guanzhong regions is increasing yearly. The capital outflow scale in the Guanzhong region is the largest, followed by Southern Shaanxi, while the capital outflow of the two cities in Northern Shaanxi is maintained in a relatively balanced state. Capital outflow in the three regions is closely related to the characteristics of their economic growth. Northern Shaanxi, Guanzhong, and Southern Shaanxi have different resource endowments and industrial development paths, and their economic growth is quite different. Northern Shaanxi is rich in energy resources, and the leading industry of energy industry is prominent. As industrial structure adjustment, the two cities in northern Shaanxi have actively promoted transforming and upgrading the energy industry. Focus on the development of a high-end energy industry base. The characteristics of economic development in resource-transforming cities lie in the large demand for capital, so the loss of capital to the outside world is relatively small.

The five cities in the Guanzhong area have a large base number, a strong industrial base, and a pivotal economic position in Shaanxi Province. However, the industrial layout of each city in Guanzhong area is concurrent, and the economic development is uneven. The economic development situation of each city is differentiated. Guanzhong region is flat, the comparative advantage of agricultural development is significant, suitable for agricultural planting and the development of characteristic agriculture, the level of agricultural mechanisation is high, and the characteristics of a large outflow of rural surplus funds to support industrial development are very obvious. The economic foundation of the three cities in southern Shaanxi is relatively weak, and their economic development is greatly restricted by ecological protection. Green recycling industry and eco-tourism may be the main direction of future

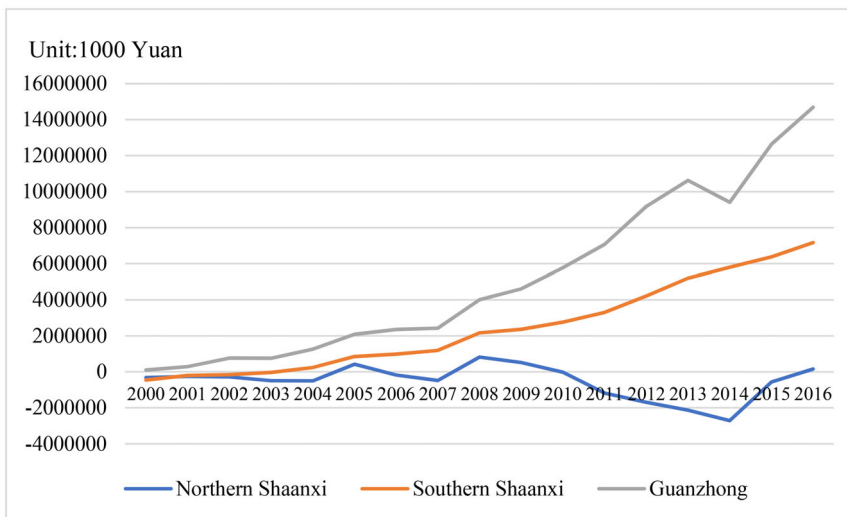


Figure 2. Scale of capital loss in three regions of Shaanxi Province.
Source: authors' own production.

economic growth in southern Shaanxi, rural capital can not find suitable investment exports, the industrial system is not mature, and the scale of capital outflow is large.

5. Results and discussion

5.1. Data co-integration results and discussion

According to Figures 3–6, there is a significant positive correlation between financial development in rural areas and rural economic growth, and a negative correlation between the proportion of rural financial capital outflow scale to rural financial scale and rural economic growth, while there is a negative correlation between rural financial capital outflow scale and rural financial scale. On the one hand, the loss of rural financial capital reduces the speed of rural economic capital accumulation, slows down the speed of industrial structure upgrading, expands the income gap between urban and rural areas, and inhibits technological innovation (Liu et al., 2022b; Y. Li et al., 2022), and has a direct negative impact on economic growth. On the other hand, the loss of rural financial capital has affected the market function of rural finance and hindered the expansion of the rural financial scale, which habits rural economic growth.

Owing to the long panel data, we use the HT test of Harris and Tzavalis (1999) to verify its stationarity, including individual fixed effects and trends. Tables 3 and 4 reveal that the variables utilised are stable and that cointegration relationships exist between the data.

The first two tests assume that the overall is cointegrated, and the last two tests assume at least one cointegrating relationship. The fourth is the rejection of the null hypothesis, and therefore the data selected are cointegrated.

5.2. Empirical results and discussion

A mixed regression model is first established. The Hausman test can verify the choice of a fixed effect model or random effect model. According to the test result, the chi-square

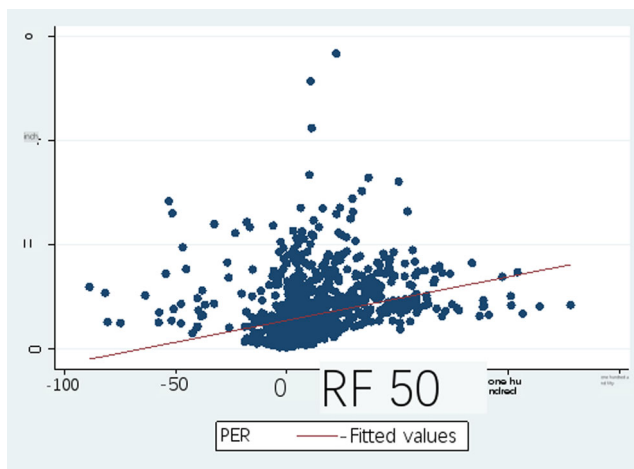


Figure 3. GDP per capita and capital outflow.
Source: authors' own production.

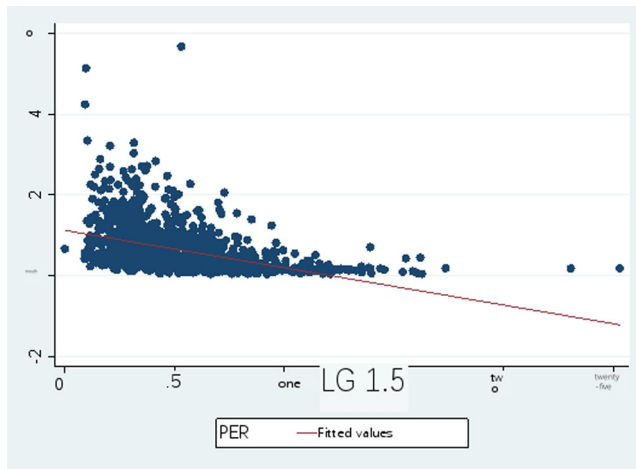


Figure 4. GDP per capita and the proportion of loans to GDP.
Source: authors' own production.

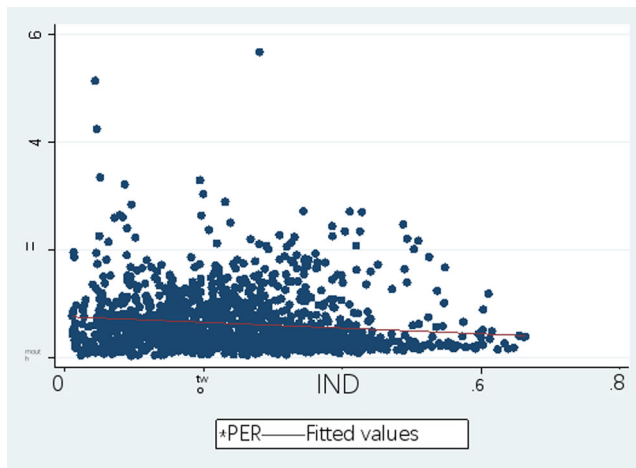


Figure 5. Per capita GDP and the proportion of primary industry.
Source: authors' own production.

statistic is 42.89, and the corresponding p-value is 0.0000, which indicates that the null hypothesis can be rejected at a 0.001 level. There is a systematic difference between the coefficient estimators of the two models drawn. Therefore, a fixed effects model is selected.

5.2.1. Baseline regression results and discussion

Due to the differences in social and cultural traditions, economic growth level, geographical location, county policies, and other factors, the intercept of the model will be different. Only the individual fixed effect is considered. For the estimation of the fixed effect model, the within-group estimator is selected. The results are shown in Table 5.

Table 5 reveals that the higher the capital outflow, the less the capital outflow of the county (city), the more loans, and the more funds retained in the local area, which positively impacts the economy. Capital is a major source of economic growth. The higher the capital balance of a county (city), the more financial support it can

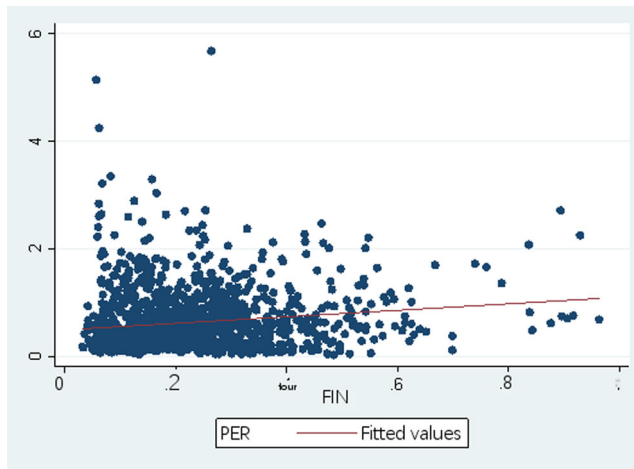


Figure 6. Per capita GDP and the proportion of fiscal expenditure to GDP.
Source: authors' own production.

Table 3. Panel unit root test results.

Variables	Statistics	P value	Conclusion
GDP per capita	0.60	0.00	Smooth
Capital outflow	0.44	0.00	Smooth
Ratio of loans to GDP	0.53	0.00	Smooth
Proportion of primary industry	0.50	0.00	Smooth
Proportion of fiscal expenditure to GDP	0.69	0.01	Smooth
Natural population growth rate	0.46	0.00	Smooth
Investment in fixed assets	0.26	0.00	Smooth
Level of education	0.31	0.00	Smooth

Source: authors' own production.

Table 4. Cointegration test results.

Statistics	Z value	P value	Conclusion
GT	0.92	0.002	Overall cointegration
GA	0.44	0.002	Overall cointegration
PT	0.53	0.001	At least one cointegration
PA	0.50	0.000	At least one cointegration

Source: authors' own production.

provide for economic growth. The industrial structure of counties and districts in Shaanxi Province is seriously differentiated. The complete system of the secondary industry in some counties and districts needs to be improved, and the secondary industry is a capital-intensive industry, so the importance of the loan balance of a county and district to economic transformation and development is beyond doubt.

The proportion of the primary industry inhibits economic growth; that is, the higher the proportion of the primary industry, the lower the per capita GDP. Rural areas account for a large proportion of the county economy, and agriculture is also an important industry in Shaanxi counties and districts, but the primary industry has the characteristics of low efficiency, a marginal decline of per capita output, and is suitable for industrial management (Zhu & Wang, 2021). Agriculture is a labour-intensive industry. In the era of low agricultural mechanisation, the larger the proportion of agriculture, the smaller the per capita GDP.

Table 5. Baseline regression results.

Explained variable Explanatory variable	Rural economic growth			
	Model one Mixed regression	Model II Fixed effect	Model three Mixed regression	Model IV Fixed effect
Capital outflow	0.00423*** (0.0103)	0.599*** (0.0082)	0.0099*** (0.0109)	0.0371*** (0.0118)
Proportion of primary industry	-0.8047*** (0.4758)	-0.672** (0.06795)	-0.5670*** (0.04075)	-0.2001** (1.9541)
Ratio of loans to GDP	-2.0125*** (010442)	-1.3614*** (0.1808)	-1.8489*** (0.7485)	-1.1813*** (0.8132)
Proportion of fiscal expenditure to GDP			0.1246*** (0.0124)	0.0267*** (0.0122)
Population growth rate			-2.6776*** (15.4360)	1.4883*** (15.4300)
Investment in fixed assets			2.58826*** (1.6068)	1.6328** (1.8526)
Level of education			4.0249** (5.9788)	5.5204* (6.4982)
Intercept	3.1794*** (0.5530)	3.1277*** (0.6121)	3.0453** (1.2389)	3.6658*** (1.3256)
Number of observations		1,377		1,377
Intragroup R ²		0.39		0.55
Intergroup R ²	1,377	0.45	1,377	0.63
R ²	0.34	0.39	0.46	0.43

Note: ***, **, and * indicate that the null hypothesis is rejected at the significance levels of 1%, 5%, and 10%, respectively. The value in parentheses below the coefficient is the t-statistic.

Source: authors' own production.

The impact of loans as a share of GDP on the economy is negative. The higher the proportion of loans, the higher the demand for funds, but the fragility of the county economy and the unsustainability of loans can not provide benign support for the development of the county economy, which also shows the importance of local deposit balance.

Fiscal expenditure is positive for economic development. Health care, education, pension, and other investment in financial expenditure have a long-term impact on the economic development of counties and districts, and this model also confirms the positive effect of education on economic development, which enlightens the county government to pay more attention to 'investment in people'.

5.2.2. Robustness test result and discussion

To examine the model's stability, the rural residents' net income is used to replace the per capita GDP as a proxy indicator of economic development. The results are shown in Table 6. It can be found that the results of the model are robust.

5.2.3. Dynamic panel empirical results and discussion

Because of economic activity inertia, the current economic behaviour will be affected by the economic indicators of the previous period to a certain extent. The per capita GDP with a lag period establishes a dynamic panel model. The Sargan test P values for the samples all exceeded 0.9, indicating that the tool was valid. The residual serial correlation test shows that the residual after difference has only first-order serial correlation but no second-order serial correlation, so the estimation result can conclude

Table 6. Model stability test.

Explained variable Explanatory variable	Rural economic growth			
	Model (1) Mixed regression	Model (2) Fixed effect	Model (3) Mixed regression	Model (4) Fixed effect
Capital outflow	0.2263*** (3.7206)	0.7054*** (4.5957)	0.6340** (2.3225)	0.8578** (2.4725)
Ratio of loans to GDP	-3.2231*** (2.8137)	-2.9231*** (3.1573)	-1.3575*** (1.8387)	1.3357 (1.9665)
Proportion of primary industry	-1.4833*** (3.5714)	-1.9767*** (1.5041)	-2.1675*** (3.3236)	-2.6993*** (4.2144)
Proportion of fiscal expenditure to GDP			2.1780*** (3.9686)	3.9228*** (2.0926)
Natural population growth rate			-1.9014*** (3.5143)	-1.6110*** (2.0558)
Investment in fixed assets			0.0029*** (0.0001)	0.0022*** (0.0001)
Level of education			2.2519*** (1.7023)	3.9722*** (1.9775)
Intercept	8.7862*** (2.6816)	9.1842*** (2.1477)	7.8168*** (2.8974)	9.2742*** (2.4393)
Number of observations	1,377	1,377	1,377	1,377
Intragroup R^2		0.2244		0.3251
Intergroup R^2		0.4790		0.5222
R^2	0.383	0.474	0.792	0.876

Note: ***, **, and * indicate that the null hypothesis is rejected at the significance levels of 1%, 5%, and 10%, respectively. The value in parentheses below the coefficient is the t-statistic.

Source: authors' own production.

that the error term of the original model has no serial correlation. The empirical analysis results are shown in Table 7.

Table 7 reveals that per capita GDP has a certain inertia effect; that is, per capita GDP in the past period will have a positive effect on per capita GDP in the current period. Regions with better economic performance in the past also have better infrastructure, population education level, and social security system, which will have a virtuous circle effect on future economic growth (Zhou & Yang, 2023). The current economic performance of counties and districts with poor economic performance in the past will be affected by the problems left over by history, which will lead to the current period being dragged down by the past period, which shows the importance of developing the current economy. Especially in those poor counties and districts, we need to increase policy support to eliminate the 'poverty trap' as soon as possible (Yu, 2023).

6. Conclusions and recommendations

Based on the statistical data of 81 counties in Shaanxi Province from 2000 to 2016, we test the impact of rural capital outflow on economic growth in Shaanxi Province by using static and dynamic panel data models. Firstly, the rural capital outflow is detrimental to the accumulation and sustainable development of rural capital and occupies investment in local rural economic growth. The capital outflow has a negative impact on economic growth. Secondly, rural economic growth has an inertial effect. Poor counties and districts must implement strong policy shocks and increase capital investment to gradually escape the poverty trap. Thirdly, the calculation of capital outflow in northern Shaanxi, Guanzhong, and southern Shaanxi reveals that

Table 7. Empirical results of dynamic panel.

Explained variable Explanatory variable	Rural economic growth			
	Differential GMM GDP per capita	Differential GMM GDP per capita	System GMM GDP per capita	System GMM GDP per capita
GDP per capita with a lag period	0.333*** (0.028)	0.329*** (0.042)	0.464*** (0.044)	0.442*** (0.054)
Capital outflow	0.224*** (3.122)	0.742*** (4.122)	0.642*** (2.221)	0.763*** (2.610)
Ratio of loans to GDP	-3.416*** (2.159)	-2.412*** (3.082)	-1.330*** (1.143)	-1.358*** (2.093)
Proportion of primary industry	-1.018 (5.107)	-1.687*** (1.208)	-2.171* (1.089)	-2.734*** (3.210)
Proportion of fiscal expenditure to GDP			0.044** (0.066)	0.071* (0.065)
Natural population growth rate			-1.0831*** (1.322)	-1.091*** (1.443)
Fixed investment			0.153*** (0.043)	0.182*** (0.043)
Level of education			1.0515*** (0.04)	1.0515*** (0.004)
Intercept	1.419*** (0.056)	1.427*** (0.067)	1.346*** (0.051)	1.354*** (0.071)
Number of observations	1377	1377	1377	1377
P value of AR (1) test	0.0004	0.0005	0.0003	0.0005
P value of AR (2) test	0.0845	0.1221	0.1478	0.1221
P value of Sargan test	0.9922	0.9951	1	1

Note: ***, ** and * indicate that the null hypothesis is rejected at the significance levels of 1%, 5% and 10%, respectively. The value in parentheses below the coefficient is the t-statistic.

Source: authors' own production.

the capital outflow in northern Shaanxi is not obvious, and there are signs of capital reflux in southern Shaanxi and Guanzhong areas have become the key areas of capital outflow. As such, we put forward the following recommendations to deepen the reform of the rural financial supply side and improve the high-quality development of the county's rural economy by boosting the current situation of rural capital outflow.

First, policymakers should maximise the decisive role of the market in mitigating rural capital outflow and optimising financial resource allocation. We find that loan balances within counties are directly proportional to economic growth. Therefore, policymakers should continuously increase financial marketability in rural areas at large. For example, government formulators can synthesise policy tools such as differentiated refinancing, rediscounting, and new property mortgage loans. Agricultural-related financial institutions should be guided to return to their origins, apply financial resources to key areas of rural economic and social development, strengthen cooperation with the government, and increase loan support to rural economic entities.

Second, policymakers should implement more favourable fiscal policies for agricultural loans and increase the investment of compensation funds. Rural economic entities in backward and poor areas can become path-dependent on capital outflow and have insufficient development incentives. Therefore, policymakers should effectively drive the implementation of existing preferential fiscal and tax policies for agricultural loans. Meanwhile, policymakers should eliminate the old and increase the risk compensation for loan subjects in backward regions. Building on this foundation, the

breadth of rural financial services should be expanded and the depth of services deepened. Every effort should be made to meet farmers' needs, help farmers get rid of path dependence, and stimulate the internal vitality of individuals.

Third, the finance industry should identify and establish linkage mechanisms that match local factor markets and develop development directions compatible with regional characteristics. Industrial prosperity is the key point among the overall requirements of rural revitalisation. Making full use of online and offline platforms to build a comprehensive financial system for integrated development. High-quality financial services are realised to help the smooth realisation of rural agricultural modernisation precisely.

Disclosure statement

No potential conflict of interest was reported by the authors.

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