Article

Does Local Government’s Competitive Behavior to Attract Foreign Investment Affect Ecological Welfare Performance? Evidence from China

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Abstract: Ecological welfare performance (EWP) is an essential indicator of sustainable socioeconomic development. In China, the government-led economic development paradigm mandates that the competitive behavior of local governments is a major influencing factor on EWP. This research explores how the government’s competitive behavior to attract foreign investment affects ecological welfare performance. Based on the super-efficiency slacks-based measure (SBM) model to assess the level of EWP in China, this paper utilizes a two-way fixed-effects model to determine the impact of local governments’ foreign investment competition on EWP. The results indicate the following. (1) Although introducing foreign investment may promote regional EWP, local governments’ vicious competition in introducing foreign investment is detrimental to its improvement. (2) The effect of local governments’ foreign investment competition on EWP exhibits various heterogeneous characteristics that depend on the differences in the regional distribution and intensity of competition for fiscal revenue and expenditures. (3) Resource factor mobility has a significant moderating effect on the impact of local governments’ competition for foreign investment on EWP. Capital mobility weakens the inhibitory effect of governments’ competition for foreign investment on the enhancement of EWP, while technological mobility and labor mobility have the opposite moderating effect. These findings may clarify the impact of governments’ competition for foreign investment on EWP and provide policy guidelines and implications for other countries pursuing the expansion of foreign direct investment (FDI).

Keywords: governments’ competition for foreign investment; ecological welfare performance (EWP); heterogeneity; resource factor mobility

1. Introduction

As an implementer of macroeconomic policy, the government plays a vital role in promoting the high-quality development of regional economies [1]. Under the influence of “economic tournaments” and “political promotion tournaments”, the enthusiasm of local governments for participating in the economic construction of their jurisdictions has continued to rise, and attracting investment has become an important way for local governments to compete economically [2]. In the reality of the relative shortage of domestic capital, foreign direct investment (FDI) is favored by local governments due to its technological and efficiency-related advantages [3], which prompts local governments to compete fiercely for foreign capital [4]. However, while local governments compete for foreign investment, the introduction of low-quality foreign investment inevitably intensifies environmental pollution in their jurisdictions [5], causing conflict between humanity and nature and introducing certain obstacles to sustainable development.

With the rapid development of the global economy and society, people’s need for a better life has progressed from a simple material demand to a compound demand covering material, environment, and welfare factors. This change in demand implies that it is not sufficient for local governments to pursue economic growth as their only objective.
Furthermore, they should also pursue the maintenance of the ecological environment and the well-being of society [6]. They must pay more attention to ecological welfare performance (EWP). Like energy consumption per unit of gross domestic product (GDP), EWP reflects a country or an area’s ability to convert ecological and natural consumption into social welfare. It is an important measure of the sustainable development of social ecology, economic growth, and social welfare. When the government competes for foreign capital, it is not conducive to ecological welfare enhancement to merely pursue economic growth while ignoring the associated potential environmental degradation. In the current era of a diversified and open economy, global economic exchange and trade are increasingly frequent, and governments worldwide are keen to compete for FDI. Optimizing local governments’ behavior in competing for foreign capital to promote regional ecological welfare is an inescapable issue that every government must address. Thus, it is crucial and valuable for governments worldwide to achieve sustainable domestic development to clarify how governments’ foreign investment competition behavior affects regional WEP, which is the leading research content of this paper.

EWP covers a multidimensional nature–economy–society coupling connotation. The existing literature considers the effect of economic growth [7,8], the degree of marketization [9], the level of urbanization [5], technological progress [10], industrial structure [11], environmental regulation [12], and FDI [13] on EWP. However, few studies have included local governments’ foreign investment competition and EWP in the same analytical framework to investigate their interrelationship. Therefore, whether a government’s competitive behavior in introducing foreign investment will affect EWP remains untested. Based on the behavioral tendency of local governments to promote regional sustainable development, this paper explores the impact of governments’ foreign investment competition on WEP from theoretical and empirical perspectives and, to a certain extent, bridges the relevant research gaps. As the world’s largest developing country, China is actively pursuing the establishment of a dual-circulation pattern that is more open domestically and internationally. Exploring the effects of local governments’ foreign investment competition on EWP in China is necessary as an example for other developing countries that wish to expand their openness to the outside world.

Based on panel data of 30 provincial administrative regions in China from 2001 to 2020, this study assessed the level of EWP using the proposed super-efficiency SBM model. Furthermore, we analyzed the influence of local governments’ foreign investment competition on EWP in China using a two-way fixed-effects model. We determined that governments’ competition for foreign investment significantly inhibits the improvement of EWP. After using an instrumental variable approach to address endogeneity and running a series of robustness tests, the conclusions still held. Regional heterogeneity analysis indicated that the effect of governments’ foreign investment competition on EWP differs significantly between the eastern, central, and western regions. Except for the central area, the effect of local governments’ foreign investment competition on EWP shows a significant suppressive effect. The heterogeneity between the intensity of local governments’ fiscal revenue and expenditure competition demonstrates that foreign investment competition has a significantly inhibitory effect on EWP under a medium or high-level intensity of fiscal expenditure and taxation competition. Nonetheless, governments’ foreign investment competition significantly promotes EWP under a low-level intensity of fiscal expenditure and taxation competition. Resource factor mobility also has a significant moderating effect on the impact of governments’ foreign investment competition on EWP. Capital mobility weakens the inhibitory effect of such competition on EWP, while technological and labor mobility strengthen its negative impact.

The contributions of this study are as follows.

- First, few papers have explored the effect of governments’ foreign investment competition behavior on EWP. Based on the context of the Chinese political environment, this study adopts game theory to explore the influence of local governments’ foreign capital competition on EWP. Thus, it bridges the research gap between governments’
foreign investment competition and WEP, broadens the theoretical analysis of the consequences of governments’ competition for foreign investment, and expands the study of the factors influencing WEP.

• Second, existing studies have mainly analyzed heterogeneity from the perspective of regional differences. This research includes other competitive behaviors (i.e., the competition of local governments for fiscal spending and tax revenue) in its heterogeneity analysis. Thus, it discusses the impact of governments’ competition for foreign capital on WEP under different intensities of competition for fiscal expenditure and tax revenue.

• Third, this study introduces the domestic factor flow as a regulating variable. It examines whether the impact of governments’ foreign capital competition on WEP has a regulatory effect in terms of three dimensions, namely, capital mobility, technological mobility, and labor mobility. The conclusions of this study provide a basis for promoting the rational allocation of factors between regions and optimizing the competitive behavior of governments in attracting foreign investment.

The remainder of this paper is organized as follows: Section 2 reviews the related works. The theoretical analysis and research hypotheses are presented in Section 3. Section 4 presents the research methodology. The findings of this study are highlighted in Section 5. Section 6 provides conclusions and future policy recommendations.

2. Related Works

EWP is the relative ratio between the amount of social welfare value generated and the resources consumed. It can reflect the efficiency of a country or region in converting natural consumption into welfare values [8] and is an essential measure of economic and socially sustainable development. Existing studies on EWP mainly focus on the following aspects:

• Studies on the measurement of EWP. Some current studies have used the ratio method to measure the value of EWP based on its meaning. For example, some studies use the ratio of services to throughput [14], the ratio of subjective and objective welfare to ecological footprint [15], and the ratio between human development index and ecological footprint [7,16] to calculate EWP. In addition, some studies measure EWP by establishing a system of EWP assessment indicators with non-proportional algorithms from input and output perspectives. Many studies, for instance, measure EWP using stochastic frontier production functions [17], data envelopment analysis [18,19], super-efficiency SBM models [20–22], two-stage super-NSBM models [23], and network DEA models [24].

• Research on the influencing factors of EWP. Previous studies found that the degree of marketization, urbanization rate, technological progress, industrial structure, environmental regulation, and FDI have significant effects on EWP, among which the degree of marketization [9,12], urbanization rate [5,25], technological progress [10,26], environmental regulation [12,20], and FDI [7,13] have substantial positive effects on EWP; while industrial structure has a negative inhibitory effect on EWP [11,25].

• Analysis of EWP from the perspective of spatial and temporal effects. Existing studies have used the Gini coefficient, coefficient of variation, spatial measures, and social network analysis to study EWP’s spatial and temporal distribution characteristics. Globally, among the 19 countries of the G20 from 1996 to 2007, only China, Brazil, and Mexico showed a downward trend in EWP; the EWP of the other 16 countries showed an upward trend [27]. From China’s domestic situation perspective, EWP changes are manifested explicitly in the trend of “fluctuating rise—continuous decline—fluctuating decline” [28].

• Studies on the relationship between EWP, economic growth, and sustainable development. Zhu and Zhang [8] find that as the economic growth rate accelerates, EWP shows an inverted U-shaped trend of growth followed by a decrease. Feng and Yuan [29] argue that EWP considered from the angle of resources, environment, and ecology coincides with the concept of sustainable development, and is a new analytical
tool for studying sustainable development. Xiao et al. [30] believe that strengthening the long-term exchange and cooperation between local governments can form a high-quality development model with complementary advantages among regions, which will be conducive to improving EWP.

Local government competition has long been an important tool to intervene in regional economic development. In engaging in what is effectively a promotion tournament, the Chinese local governments are driven by the motive of “competition for growth” and are eager to attract foreign investment [31]. Currently, studies on local foreign investment competition are mostly focused on the following aspects:

- Studies on the relationship between governments’ foreign investment competition and economic growth. Some scholars believe local governments’ foreign investment competition promotes regional total factor productivity [32] and drives regional economic development. At the same time, foreign investment competition will optimize the governments’ administrative efficiency [33] and bring them out of the inefficient equilibrium, significantly promoting economic development [34]. However, some scholars also argue that the preferential policies for attracting capital during governments’ foreign investment competition have a squeeze-out effect on local capital, and the withdrawal of such local capital may hurt the area’s economic growth [35].

- Research on the relationship between governments’ foreign investment competition and ecological environment. Existing studies suggest a “competition to the bottom” or “competition to the top” in the above relationship. In pursuit of regional economic development, local governments tend to compete strategically in attracting foreign investment, increasing their competitive advantage by granting tax incentives to foreign investors and lowering ecological and environmental regulation standards [36]; however, this behavior ignores the long-term impacts on the environment and resources, making foreign investment competition a “race to the bottom” [37]. However, with the inclusion of ecological indicators in the performance appraisal, high-quality foreign investment is favored by local governments. Local governments compete to raise the threshold of FDI introduction to achieve technology spillover, which leads to a shift from “competition at the bottom” to “competition at the top” [38].

- Discussions about the relationship between governments’ foreign investment competition and welfare growth. From the game perspective, regional governments’ successive preferential policies for attracting foreign investment will lead to competition with each other, and the competition will bring unnecessary loss of regional welfare [39]. If a vertical matching transfer mechanism is introduced, it can partly compensate for the welfare loss and improve the welfare level of both competing parties [40].

In summary, the existing discussions on local governments’ foreign investment competition and EWP mainly present two parallel lines. Few researchers have combined study of governments’ foreign investment competition and EWP to explore the influence mechanism between them. This study focuses on the effect of local governments’ foreign investment competition on EWP and discusses the inhibitory impact between them from theoretical and empirical perspectives. The findings of this research provide policy guidelines on how to promote the improvement of EWP and serve as a reference for other countries that want to optimize the foreign investment introduction mode and foster sustainable social development.

3. Theoretical Analysis and Research Hypothesis

Existing studies have suggested that increasing the level of FDI is conducive to promoting EWP [13]. FDI is an essential factor in promoting regional economic development. On one hand, the inflow of FDI can provide the host country with clean production technologies and more mature management experience, creating a knowledge spillover effect [41] that is beneficial to increasing regional GDP and reducing environmental pollution. On the other hand, FDI’s contribution to the regional economy will also increase its tax revenue, allowing the government to spend more on environmental management and social
welfare [42]. Thus, FDI makes a positive contribution to EWP. However, although the introduction of foreign investment by the government is beneficial to EWP, can its competitive behavior in attracting that foreign investment promote the enhancement of EWP?

Under China’s politically centralized and fiscally decentralized system, local governments have the status of independent game subjects. In the competition for foreign investment, local governments often lower their threshold for foreign investment to be in a more advantageous position. However, this behavior will lead to many highly polluting and energy-consuming enterprises moving in, causing environmental degradation and increasing environmental management costs. On the other hand, the “butterfly effect” caused by decreasing the threshold for capital introduction will affect the behavior of other competitive agents and introduce foreign competition with the phenomenon of “competition to the bottom”. At this time, the foreign capital competition of local governments will inevitably increase the possibility of regional environmental pollution, which is not conducive to improving EWP.

This research establishes a game model to analyze the cooperation and competition of local governments and explore the impact of foreign investment competition on EWP. The assumptions of game model analysis are as follows:

- Suppose that there are two independent local governments (Governments A and B) in a particular region and that they obtain foreign investment to promote the improvement of regional EWP (the number of governments does not affect the conclusions of this paper).
- Participants in the game have high cognitive rationality and behavioral rationality. They ask about the maximization of their interests (in this study, they pursue the maximization of EWP), and they each know the other is rational.
- From each subject’s perspective of action payment, if the two governments adopt a cooperative strategy, each receives an EWP improvement of $\partial_1$. If the two parties adopt different approaches, the one that chooses to cooperate obtains EWP improvement of $\partial_2$, and the one that chooses not to cooperate obtains EWP improvement of $\partial_3$. If the two governments compete, each receives an EWP improvement of $\partial_4$.

For a single local government, choosing competition means that in addition to paying additional costs, it must also pay for tax incentives and environmental pollution caused by lowering the threshold for attracting investment. In contrast, choosing cooperation means that local governments can establish a trust mechanism and formulate investment attraction policies that are based on a regional development perspective, which may prevent the losses caused by vicious competition. When a local government participates in competition, it can obtain as much foreign capital as possible at a lower cost. The entry of foreign capital will improve regional EWP to the greatest extent, so $\partial_3 > \partial_1$, $\partial_3 > \partial_2$ and $\partial_3 > \partial_4$. With the participation of local governments in competition, all entities decrease their threshold for attracting foreign capital. Although governments may introduce some foreign capital, not all foreign investment is environmentally friendly. Introducing non-environmentally friendly foreign capital is not conducive to improving ecological welfare. When both parties choose to cooperate, establishing a trust mechanism will eliminate unnecessary losses. The introduction of foreign capital does not need to significantly reduce the standards for attracting foreign capital, which benefits the EWP of both parties. Therefore, $\partial_1 > \partial_4$ and $\partial_4 > \partial_2$. Overall, the magnitude of the EWP induced under each government’s foreign investment competition strategy is ranked as $\partial_3 > \partial_1 > \partial_4 > \partial_2$.

The payment matrix of the game of attracting foreign investment between the two local governments is shown in Figure 1. After implementing the corresponding strategies, the first and second numbers in the payment matrix represent the EWP values obtained by Governments A and B, respectively. Under incomplete information, whether Government A (B) chooses to cooperate or compete, competition is an advantageous strategy for Government B (A). However, the regional EWP of local governments’ competitive introduction of FDI is less than that of the cooperative introduction of FDI. The opportunistic behavior
of both parties puts them in a “prisoner’s dilemma”. Thus, the governments’ competitive behavior in introducing foreign investment is not conducive to EWP.

### Government B

<table>
<thead>
<tr>
<th>Cooperation</th>
<th>Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\partial_1$, $\partial_1$</td>
<td>$\partial_2$, $\partial_3$</td>
</tr>
<tr>
<td>$\partial_3$, $\partial_2$</td>
<td>$\partial_4$, $\partial_4$</td>
</tr>
</tbody>
</table>

**Figure 1.** Payment matrix in the game.

In reality, local governments’ foreign capital introduction game occurs not once but many times. During a local leader’s term of office, the number of local government foreign investment games is limited. Due to the pressure of the officials’ performance appraisal system and changes in the political cycle, local governments usually focus only on their own economic development and choose a “high-risk, high-reward” foreign investment competition strategy. Because a finite number of repeated games are simply the sum of a single game, the result of several foreign investment games by local governments is still (competition, competition). Therefore, over the long run, political cycle restrictions and performance appraisal systems cause local governments to choose foreign investment competition at the expense of foreign investment cooperation, which is not conducive to the improvement of EWP. Based on this analysis, we propose the following hypothesis:

**Hypothesis 1 (H1).** Governments’ foreign investment competition is not conducive to the improvement of EWP.

### 4. Research Design

#### 4.1. Measurement and Analysis of EWP

##### 4.1.1. Super-Efficiency SBM Model

Currently, the measurement of EWP mainly uses the data envelopment approach (DEA). Traditional DEA models suffer from the problem that the calculation results are not precise enough and cannot be ranked. However, the super-efficiency SBM model, a DEA-derived model, can solve the problem of ranking due to the limitation of the range of efficiency values and compensate for the slackness of the traditional method between inputs and outputs. EWP emphasizes the ability to achieve higher welfare output with less ecological input within the ecological carrying capacity, which is consistent with the requirements of the DEA method for input–output indicators [18]. At the same time, the super-efficiency SBM model with variable scale payoff assumption and two-way optimization of input and output perspectives is closer to the actual needs of EWP measurement [24]. Thus, based on the current research results [13,20–22], this research adopts the non-radial super-efficiency SBM model to measure EWP, which is modeled as follows.

$$
\min \rho^* = \frac{\frac{1}{n} \sum_{i=1}^{n} x_{i0} / x_{i0}}{\frac{1}{n} \sum_{j=1}^{m} y_{j0} / y_{j0} + \frac{1}{n} \sum_{i=1}^{n} s_i^d / y_{i0}^d} \\
\text{s.t.} s^d \geq \sum_{j=1}^{m} x_{ij} \lambda_j s^d \leq \sum_{j=1}^{m} y_{j0} \lambda_j s^d \geq \sum_{j=1}^{m} y_{j0}^d \lambda_j s^d \\
x_0 \leq y_{0j}^d \leq y_{0j}^d \leq y_{0j}^d \\
\lambda_j \geq 0, j = 1, 2, \ldots, n, j \neq 0; i = 1, 2, \ldots, m \\
p = 1, 2, \ldots, r_1; q = 1, 2, \ldots, r_2
$$

(1)
where \( m \) and \( r \) represent the number of input and output element species in the target system; \( r_1 \) and \( r_2 \) represent the number of consensual and non-consensual output species, respectively; \( x \) represents the elements in the input factor matrix, and \( s^- \) represents the input excess; \( y^d \) represents the elements in the desirable output matrix, and \( s^d \) indicates the insufficient desirable output in the model; \( y^u \) are the undesirable output matrix elements; \( s^u \) represents excessive undesirable output; \( \lambda \) is the weight matrix; and \( \rho^* \) represents the value of EWP.

### 4.1.2. Construction of EWP Evaluation Indicator System

Based on the current research results, this study proposes an EWP evaluation index system from the perspective of inputs and outputs. Figure 2 demonstrates the composition of the EWP evaluation index system, which contains the input system and output system. The input system includes capital input, labor input, energy input, land input and water input. The output system includes desirable outputs and undesirable outputs. Referring to the method of Liu et al. [9], this research uses solid waste, wastewater, and waste gas as undesirable outputs. Economic development level, education development level, and healthy living standard are desirable outputs. Table 1 shows the application of each evaluation indicator in previous EWP evaluation studies, and most indicators have been widely used. Given the completeness and availability of the data, we selected the indicators in Table 1 to evaluate EWP.

![Figure 2. Evaluation indicator system of EWP.](image-url)
4.1.3. Spatial and Temporal Evolutionary Characteristics of EWP in China

In this research, we measured Chinese provinces’ EWP values from 2001 to 2020 based on the above evaluation index system. Figure 3 shows the average level of EWP and the percentage of the number of provinces with performance values above 1 in China over the sample period. As can be seen from Figure 3, the national average level of EWP shows an inverted “N”-shaped trend of decreasing, then increasing, then reducing again. The national average level has not yet reached the most efficient production frontier (when the performance value exceeds 1, the most efficient production frontier is reached), and there is still much room for improvement. Additionally, in nearly half of the years in the sample period, the number of provinces that reached the effective production frontier accounted for more than 1/2. The changing trend of the proportion of provinces that reached the effective production frontier is consistent with the changing direction of the national average level.

![Figure 3. Trends in the evolution of EWP in China.](image)

Figures 4–6 show the trends of EWP for each province in the eastern, central, and western regions of China from 2001 to 2020. As seen from Figure 4, the values of EWP generally showed a decreasing trend, with only Beijing showing an increasing trend since 2005. In terms of the provinces that reached the effective state of EWP, only Beijing, Shanghai, and Tianjin maintained their performance values in the effective condition throughout the sample period. From 2004 onward, the EWP of most provinces in eastern China began to decline; in the following years, the performance values mostly fluctuated up and down.

![Figure 4. Evaluation indicator system of EWP.](image)

![Figure 5. Evaluation indicator system of EWP.](image)

![Figure 6. Evaluation indicator system of EWP.](image)

Table 1. Sources of EWP measurement indicators.

<table>
<thead>
<tr>
<th>Evaluation Index</th>
<th>Citation Source</th>
</tr>
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<tbody>
<tr>
<td>Fixed asset investment per capita (yuan)</td>
<td>[11,20,21,25]</td>
</tr>
<tr>
<td>Labor force per 10,000 people (person)</td>
<td>[11,21,23–25]</td>
</tr>
<tr>
<td>Energy consumption per capita (kilogram of standard coal/person)</td>
<td>[9,11,18,20,21,23–25,28]</td>
</tr>
<tr>
<td>Built-up area per capita (square meter/person)</td>
<td>[9,12,18,22–24]</td>
</tr>
<tr>
<td>Water consumption per capita (cubic meter/person)</td>
<td>[9,12,18,23–25,28]</td>
</tr>
<tr>
<td>Per capita gross regional product (yuan)</td>
<td>[9,11,18,20,25,28,30]</td>
</tr>
<tr>
<td>Number of students per 10,000 population in higher education institutions (person)</td>
<td>[21,30,43,44]</td>
</tr>
<tr>
<td>Number of health technicians per 1000 population (person)</td>
<td>[22–24,28,30]</td>
</tr>
<tr>
<td>Chemical oxygen demand (COD) emissions per capita (kilogram/person)</td>
<td>[9,18,20,23,25,28,30]</td>
</tr>
<tr>
<td>Smoke and dust emissions per capita (kilogram/person)</td>
<td>[9,18,20,23,25,28,30]</td>
</tr>
<tr>
<td>General industrial solid waste generation (kilogram/person)</td>
<td>[9,18,20,23,25,28,30]</td>
</tr>
</tbody>
</table>
increasing trend since 2005. In terms of the provinces that reached the effective state of EWP during the sample period, most of the provinces with effective EWP were located in the central and east regions.

The values of EWP of provinces in western China.

Figure 4. The values of EWP of provinces in eastern China.

The values of EWP of provinces in central China.

Figure 5. The values of EWP of provinces in central China.

The values of EWP of provinces in western China.

Figure 6. The values of EWP of provinces in western China.
Figure 5 illustrates the provinces’ EWP in central China. The figure reveals that, in line with the national average, the values of EWP for most of the provinces in the central region showed an inverted N-shaped trend of decreasing, increasing, and decreasing. From the data sample of the central region, some provinces occasionally reached the effective state of EWP during the sample period.

Figure 6 demonstrates the values of EWP of provinces in western China. The variation in EWP in China’s west was highly volatile, with the most significant variation in EWP values in Xinjiang and Qingdao, where the difference between the maximum and minimum values exceeded 0.8. Compared to eastern and central China, the EWP of provinces in western China was generally lower. Most of the provinces with effective EWP were located in the central and east regions.

The comparative analysis in the previous section shows significant differences in EWP across regions in China, with higher levels in the central and eastern areas and lower levels in the western region. The above situation may be due to the disparity between regions in economic development and resource endowment and may also be related to governmental regional construction planning. Since the reform and opening up, under the influence of the concept of “Earlier and Later Prosperity, Eventually Common Prosperity”, the eastern coastal areas have taken the lead in development. Influenced by the economic and technological development in the east, the central area of China has also achieved more excellent development. Regional EWP reflects the coordinated coupling of economic development, ecological environment, and social welfare. The more developed central and eastern regions enjoy higher levels of economic growth and social welfare, making the EWP of the east and central provinces generally higher than that of the provinces in the western region.

4.2. Regression Model Setting

In the sample where the analysis is carried out with panel data, the two-way fixed-effects model can control for individual characteristics that do not vary over time, and temporal characteristics that do not vary with area, respectively. The EWP, governments’ foreign investment competition, and other control variables measured in the previous section constitute a balanced panel dataset suitable for the two-way fixed-effects model. Thus, in examining the impact of governments’ foreign investment competition on EWP, the following two-way fixed-effects regression model is constructed in this paper:

\[
EWP_{it} = \alpha_0 + \alpha_1 ECU_{it} + \delta Control_{it} + u_i + b_i + \epsilon_{it} \tag{2}
\]

where \( EWP \) denotes ecological welfare performance, \( ECU \) denotes local governments’ foreign investment competition; \( Control \) is a set of control variables containing several variables that affect \( EWP \) independently of governments’ foreign investment competition; \( u \) and \( b \) denote unobservable time fixed effects and individual fixed effects; and \( \epsilon \) represents random disturbance terms.

In this study, to alleviate the endogeneity problem due to reverse causality to some extent, we treat governments’ foreign investment competition with a one-period lag in the model and construct the following benchmark regression model. \( ECU_{it-1} \) represents a lag in the time dimension of governments’ foreign investment competition:

\[
EWP_{it} = \alpha_0 + \alpha_1 ECU_{it-1} + \delta Control_{it} + u_i + b_i + \epsilon_{it} \tag{3}
\]

Cross-regional flows of resource factors have essential impacts on social production and development. This paper introduces factor mobilities as regulating variable to explore the impact of the interaction between governments’ foreign investment competition and factor mobilities on EWP. The regression model of the regulation effect is designed as follows:

\[
EWP_{it} = \beta_0 + \beta_1 ECU_{it-1} + \beta_2 ECU_{it-1} \times CAP_{it-1} + \beta_3 CAP_{it-1} + \delta Control_{it} + u_i + b_i + \epsilon_{it} \tag{4}
\]
where CPA, TEC, and LAP denote capital mobility, technological mobility, and labor mobility, respectively, and the other variables are indicated as described above. ECU × CPA, ECU × TEC, and ECU × LAP represent the interaction terms of governments’ foreign investment competition with capital, technological, and labor mobility, respectively.

4.3. Variable Definition and Data Source Description

4.3.1. Explained and Explanatory Variables

EWP is the target variable examined in this paper, which represents the efficiency of transforming resource and environmental inputs into social welfare and is highly compatible with the sustainable development concept. This paper uses the technical efficiency value calculated by the super-efficiency SBM model to express each province’s EWP level. Governments’ foreign investment competition is the explanatory variable of this paper. Introducing FDI with significant economic benefits and spillover effects is essential for local governments to promote regional development. The competition for attracting investment carried out by various preferential policies has an essential impact on regional economic development, ecological environment, and social well-being. This paper draws on the methodology of He et al. [45] to measure governments’ foreign investment competition in terms of the level of foreign investment introduction jointly determined by two dimensions, adjacent provinces and the whole country, calculated as follows:

\[
ECU = \frac{pcFDI_{it}}{pcFDI_{jt}} \times \frac{pcTFDI_i}{pcTFDI_i}
\]

where \(pcFDI_{it} = FDI_{it}/NOP_{it}\), \(pcFDI_{jt}\) denotes per capita FDI in the country; \(FDI_{it}\) and \(NOP_{it}\) denote the amount of foreign direct investment and the population of \(i\) province (municipality directly under the Central Government) in the year of \(t\), respectively; \(pcTFDI_i = TFDI_t/TNOP_t\), \(pcTFDI_i\) denotes per capita FDI in the country; \(TFDI_t\) and \(TNOP_t\) denote national FDI and national population in the year of \(t\); \(FDI_{jt} = \max\{FDI_{ht}\}\), province of \(i\) are geographically adjacent to province of \(h\); \(pcFDI_{ji} = FDI_{jt}/NOP_{jt}\); and \(pcFDI_{ji}\) denotes the highest per capita FDI in neighboring provinces other than the province.

4.3.2. Control Variables

This paper selects the following provincial-level control variables for analysis based on existing studies [9,46]. The industrial structure is expressed as the share of secondary industry output in regional GDP. Urbanization rate is the proportion of the urban population to the total population. The financial development level is expressed as the loan balance ratio to each region’s regional GDP. Environmental regulation is measured by the amount of investment in industrial pollution control as a percentage of GDP. The scale of government spending is expressed as the share of general public budget spending in GDP in each province.

4.3.3. Heterogeneous Grouping Variables

Most existing studies have empirically studied government competition behavior from three perspectives: fiscal expenditure competition, tax competition, and foreign investment competition [47]. To this end, this study explores whether the effects of governments’ foreign investment competition on EWP differ according to the intensity of government fiscal revenue and expenditure competition. We ran group regressions based on the intensity of fiscal spending competition and tax competition to investigate the possible heterogeneous effects of fiscal revenue and spending competition. Drawing on the method
in [45], this paper used governments’ fiscal expenditures and tax revenues to measure regional fiscal expenditure competition and tax competition, calculated as follows:

\[ EC = \frac{pcGE_{it}}{pcGE_{jt}} \times \frac{pcCGE_t}{pcGE_{it}} \]  
\[ (8) \]

\[ TC = \frac{pcREV_{it}}{pcREV_{jt}} \times \frac{pcCREV_t}{pcREV_{it}} \]  
\[ (9) \]

where \( EC \) and \( TC \) represent fiscal spending competition and tax competition, respectively; \( GE_{it} \) and \( REV_{it} \) denote the province’s total fiscal expenditure and tax revenue in the year of \( t \); \( CGE_t \) and \( CREV_t \) denote the country’s total fiscal expenditure and tax revenue in the year of \( t \). Similar to the previous measures of governments’ foreign investment competition, \( pcGE_{it} \) and \( pcREV_{it} \) represent per capita fiscal expenditure and per capita tax revenue in the province. \( pcCGE_t \) and \( pcCREV_t \) represent per capita fiscal expenditure and per capita tax revenue nationwide. \( pcGE_{ji} \) and \( pcREV_{jt} \) denote the highest per capita fiscal expenditure and highest per capita tax revenue in neighboring provinces other than the province in question.

### 4.3.4. Moderator Variables

Access to resource factors is vital for government competition to promote regional development. Does resource factor mobility affect the impact of government competition for foreign investment on EWP? We examined the effects of factor mobility from three perspectives: capital mobility, technological mobility, and labor mobility. Drawing on the research in [48], this paper measured capital mobility, technological mobility, and labor mobility using total regional capital formation, granted regional patent applications, and employment in the three major industries. The following is a measure of the three types of resource mobility.

\[ CPA = \frac{GCF_{it} - GCF_{it-1}}{GCF_{it-1}} \]  
\[ (10) \]

\[ TEC = \frac{PAG_{it} - PAG_{it-1}}{PAG_{it-1}} \]  
\[ (11) \]

\[ LAP = \frac{NOE_{it} / NOP_{it} - NOE_{it-1} / NOP_{it-1}}{NOE_{it-1} / NOP_{it-1}} \]  
\[ (12) \]

where \( GCF, PAG, \) and \( NOE \) represent total regional capital formation, regional patent applications granted and regional employment in the three major industries, respectively.

### 4.3.5. Data Sources and Statistical Descriptions

Given data availability, this paper takes the annual data of 30 provinces in mainland China (excluding Macau, Hong Kong, Taiwan, and Tibet) from 2001 to 2020 as the sample, with a total of 600 observations, to constitute a balanced panel dataset, as shown in Table 2 below. The relevant data were obtained from the China Statistical Yearbook [49] and China Environmental Statistical Yearbook [50] in previous years, and the missing data were supplemented by linear interpolation.
Table 2. Summary statistics.

<table>
<thead>
<tr>
<th>Variable Symbol</th>
<th>Variable Description</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>EWP</td>
<td>Ecological welfare performance</td>
<td>0.7422</td>
<td>0.3261</td>
<td>0.2191</td>
<td>1.672</td>
</tr>
<tr>
<td>ECU</td>
<td>Governments’ foreign investment competition</td>
<td>0.2514</td>
<td>0.5798</td>
<td>0.0003</td>
<td>3.5547</td>
</tr>
<tr>
<td>IND</td>
<td>Industry structure</td>
<td>0.3831</td>
<td>0.1659</td>
<td>0.0253</td>
<td>0.5259</td>
</tr>
<tr>
<td>URBA</td>
<td>Urbanization rate</td>
<td>0.5108</td>
<td>0.1563</td>
<td>0.1573</td>
<td>0.8960</td>
</tr>
<tr>
<td>FIN</td>
<td>Level of financial development</td>
<td>0.2317</td>
<td>0.3687</td>
<td>0.0021</td>
<td>2.6762</td>
</tr>
<tr>
<td>ER</td>
<td>Environmental regulation</td>
<td>1.1204</td>
<td>0.4708</td>
<td>0.0001</td>
<td>2.4378</td>
</tr>
<tr>
<td>GOV</td>
<td>Scale of government spending</td>
<td>0.2118</td>
<td>0.1048</td>
<td>0.0472</td>
<td>0.6430</td>
</tr>
<tr>
<td>TC</td>
<td>Tax competition</td>
<td>0.6687</td>
<td>1.5344</td>
<td>0.0261</td>
<td>11.9540</td>
</tr>
<tr>
<td>EC</td>
<td>Competition in fiscal spending</td>
<td>0.9724</td>
<td>1.3628</td>
<td>0.0931</td>
<td>12.0022</td>
</tr>
<tr>
<td>LAP</td>
<td>Labor mobility</td>
<td>-0.0001</td>
<td>0.0032</td>
<td>-0.0341</td>
<td>0.0134</td>
</tr>
<tr>
<td>CAP</td>
<td>Capital mobility</td>
<td>0.1755</td>
<td>0.1339</td>
<td>-0.6265</td>
<td>0.6593</td>
</tr>
<tr>
<td>TEC</td>
<td>Technological mobility</td>
<td>0.2151</td>
<td>0.2314</td>
<td>-0.4329</td>
<td>0.8631</td>
</tr>
</tbody>
</table>

5. Empirical Analysis

5.1. Basic Regression Analysis

This paper uses a fixed-effects model to investigate the relationship between governments’ foreign investment competition and EWP. The baseline regression results of the effect of governments’ foreign investment competition on EWP are presented in Table 3. Among them, column (1) includes only governments’ foreign investment competition as an explanatory variable and controls for province fixed effects and year fixed effects. The findings indicate that the estimated coefficient of governments’ foreign investment competition is remarkably negative, which tentatively confirms the research hypothesis that governments’ foreign investment competition is detrimental to the improvement of EWP.

Column (2) adds the control variables of industrial structure, urbanization rate, financial development, and environmental regulation. The results also indicate that governments’ foreign investment competition has an inhibitory effect on EWP.

In this research, a one-period lag of governments’ foreign investment competition is introduced for regression analysis, to alleviate the endogeneity problem due to reverse causality. Columns (3)–(5) of Table 3 demonstrate the relevant regression results. The experimental results show that governments’ foreign investment competition significantly inhibits EWP at the 1% level regardless of the inclusion of control variables. The finite nature of resources and the unlimited desire for economic growth have led local governments to compete fiercely for the introduction of foreign investment. In the competition for foreign investment, local governments often enhance their competitive advantage by lowering tax rates, simplifying land use approval, and reducing labor costs. However, some regions with late development and low technology levels often prefer to relax environmental regulations to gain a tremendous competitive advantage and use lower environmental standards to attract foreign investment. Lowering environmental standards may attract pollution-intensive and low-tech industries and even cause “bottom-up competition”, aggravating environmental pollution in host countries, which is not conducive to improving EWP.

Moreover, putting aside the issue of the quality of foreign investment introduced, the differences between regions in terms of the degree of social development inevitably give local governments different advantages in the competition for foreign investment. In the competition for foreign investment, the most advantaged regions do not necessarily have a higher degree of EWP improvement from the introduction of foreign investment than those regions with a lower degree of development (those with a lower competitive advantage), given the same amount of foreign investment. This situation is because the marginal effect of foreign investment is higher in less developed regions. Therefore, from the country’s perspective, governments’ foreign investment competition does not necessarily lead to an optimal distribution of foreign capital among regions, which is detrimental to improving national EWP. At the same time, under the role of political promotion tournaments, disorderly competition among regional governments will lead to
resource allocation distortion, eventually leading to the “prisoner’s dilemma” in foreign investment competition. Establishing a green performance assessment system by including the ecological environment and social well-being in the performance appraisal of local governments will, to a certain extent, restrain the vicious competition behavior of local governments. Curbing inappropriate government competition can alleviate the tension between the economy and the ecological environment and improve EWP.

Table 3. Baseline regression results.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) EWP</th>
<th>(2) EWP</th>
<th>(3) EWP</th>
<th>(4) EWP</th>
<th>(5) EWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
<td>−0.0018 ** (0.0007)</td>
<td>−0.0020 *** (0.0007)</td>
<td>−0.0046 *** (0.0007)</td>
<td>−0.0045 *** (0.0006)</td>
<td>−0.0060 *** (0.0015)</td>
</tr>
<tr>
<td>L.ECU</td>
<td></td>
<td></td>
<td>0.6309 *** (0.2057)</td>
<td>−0.1572 (0.2300)</td>
<td>0.5698 *** (0.2190)</td>
</tr>
<tr>
<td>IND</td>
<td>0.6309 *** (0.2057)</td>
<td>−0.1720 (0.1939)</td>
<td>−0.3531 *** (0.1325)</td>
<td>−0.1283 (0.2095)</td>
<td></td>
</tr>
<tr>
<td>URBA</td>
<td>0.0207 *** (0.0069)</td>
<td>0.2237 *** (0.0510)</td>
<td>0.0240 *** (0.0075)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>0.0786 (0.0967)</td>
<td>0.1443 *** (0.0477)</td>
<td>−0.0671 (0.0868)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIN</td>
<td>−0.5006 *** (0.1554)</td>
<td>−0.8124 ** (0.3209)</td>
<td>−0.5691 *** (0.1463)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: First, robust standard errors are in parentheses. *** and ** indicate the significance level of 1% and 5%, respectively. Second, in the table, “Y” means that variables such as annual fixed effects or provincial fixed effects are controlled in the regression model, and “N” means that there is no control for related variables. Third, “L.ECU” indicates that governments’ foreign capital competition lags behind by one period in the time dimension, expressed as “ECU_{t-1}” in the formula (3). This description applies to the rest of this article.

5.2. Robustness Tests

5.2.1. Endogenous Problem Handling

To further exclude the effect of endogeneity, this study draws on Bartik’s approach [51] of building an instrumental variable, which is equal to the product of a lagged period of local governments’ foreign investment competition and its first-order differential in the time dimension. First, the instrumental variable is directly correlated with foreign investment competition across local governments. Second, after fully controlling for multidimensional fixed effects, the instrumental variable is not associated with other stochastic perturbation terms that affect EWP. Therefore, the instrumental variable satisfies both the correlation and homogeneity conditions for instrumental variables. The under-identification test (p-value of 0.0881 for the LM statistic) and the weak instrumental variable test (Wald F-statistic of 1832.799) indicate that the above instrumental variable is valid. Based on the above analysis, this research uses two-stage least square (2SLS) and Gaussian mixture model (GMM) methods for regression testing. Columns (1) and (2) of Table 4 demonstrate the above empirical results. The regression coefficients of the lagged term of governments’ foreign investment competition are significantly negative at the 1% and 5% levels, both of which indicate a significant negative effect of foreign competition on EWP, further supporting the basic conclusions of this paper.
### Table 4. Analysis of robustness test results.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) EWP</th>
<th>(2) EWP</th>
<th>(3) EWP</th>
<th>(4) ewp</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L).ECU</td>
<td>-0.0066 *** (0.0016)</td>
<td>-0.0095 ** (0.0041)</td>
<td>-0.006 *** (0.0019)</td>
<td></td>
</tr>
<tr>
<td>(L).ecu</td>
<td>-0.301 ** (0.1679)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>0.5744 *** (0.2085)</td>
<td>0.2117 (5.7114)</td>
<td>0.0897 (0.1925)</td>
<td>-0.1382 (0.2525)</td>
</tr>
<tr>
<td>URBA</td>
<td>-0.1356 (0.1992)</td>
<td>0.1054 (3.1263)</td>
<td>-0.0093 (0.1601)</td>
<td>-0.4421 * (0.2431)</td>
</tr>
<tr>
<td>ER</td>
<td>0.0243 *** (0.0072)</td>
<td>0.0496 (0.1039)</td>
<td>0.0085 (0.0070)</td>
<td>-0.0159 (0.0162)</td>
</tr>
<tr>
<td>FIN</td>
<td>-0.0791 (0.0853)</td>
<td>-1.004 (0.7254)</td>
<td>0.0422 (0.1109)</td>
<td>-0.1100 (0.1047)</td>
</tr>
<tr>
<td>GOV</td>
<td>-0.5759 *** (0.1407)</td>
<td>-0.4679 (2.1942)</td>
<td>-0.3507 ** (0.1421)</td>
<td>0.0531 (0.2311)</td>
</tr>
</tbody>
</table>

Provincial fixed effect: Y, Y, Y, Y  
Year fixed effect: Y, Y, Y, Y  
Observation: 570, 570, 570, 570  
\(R^2\): 0.6979, 0.7956, 0.7165, 0.7165  
AR(2) (p-value): 0.1540  
Sargan (p-value): 0.5050

Notes: First, robust standard errors are in parentheses, and ***, ** and * indicate the significance level of 1%, 5%, and 10%, respectively. Second, the “ecu” denotes the governments’ foreign investment competition after the replacement measurement method. At the same time, “L.ecu” represents a one-period lag of “ecu” in the time dimension. The “ewp” denotes ecological welfare performance after the replacement measurement method.

5.2.2. Replace the Measurement Method of Key Variables

In this paper, the robustness of the baseline regression results is verified by varying the measures of explanatory and explained variables. The first is to replace the way the explanatory variables are measured. Drawing on Qin and Shen [38], this paper uses the share of actual foreign investment utilization (converted at the current year’s exchange rate) in each province to regional GDP to measure local governments’ competition for introducing foreign capital. The empirical results of replacing the explanatory variables are shown in column (3) of Table 4. The next is the measure of replacing the explanatory variables. The baseline regression in this paper uses the technical efficiency values from the super-efficiency SBM model as the EWP measures. To test the robustness of the empirical results, we use the technical efficiency decomposition term (pure technical efficiency) of EWP to replace the explained variables. The empirical results of replacing the explanatory variables are shown in column (4) of Table 4. From the results of the robustness analysis, the empirical results remain in agreement with the previous benchmark regression results, regardless of the change in the measurement method of the explanatory variable or the explained variables. The effect of governments’ foreign capital competition on EWP is significantly negative at the level of 5%, which again verifies the primary conclusion of this study.

5.3. Heterogeneity Analysis

5.3.1. Regional Heterogeneity

The significant differences among provinces in terms of geographic location, resource environment, and economic development may lead to heterogeneity in the impact of local governments’ foreign investment competition on EWP in different regions. Therefore, we attempted to divide the overall sample into three subsamples of eastern, central, and western regions for regression analysis to examine whether there are regional variations in the effects of governments’ foreign investment competition on EWP. Table 5 shows the corresponding experimental results, where governments’ foreign investment competition...
significantly inhibits the improvement of EWP in the east and west areas. Still, the effect of governments’ foreign investment competition on EWP in the central region is not significant. For both eastern and western regions of China, although governments’ foreign investment competition significantly inhibits the improvement of EWP, there is a difference in the magnitude and significance level of the regression coefficients. This difference is related to the development status of the eastern and western regions. The social development in the eastern region is relatively high, and local governments can use their regional economic advantages to absorb foreign capital extensively, while the FDI introduced is not all environment-friendly. Introducing a large amount of low-quality foreign capital will lead to environmental deterioration and is not conducive to improving EWP. The western region is relatively backward in economic development and less likely to attract foreign investment than the eastern region. Thus, the effect of local governments’ foreign investment competition on EWP in the western region is less significant than that in the eastern part.

Table 5. Regional heterogeneity regression results.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) East</th>
<th>(2) Central</th>
<th>(3) West</th>
</tr>
</thead>
<tbody>
<tr>
<td>LECU</td>
<td>−0.0067*** (0.0020)</td>
<td>0.4297 (0.3899)</td>
<td>−0.0030** (0.0012)</td>
</tr>
<tr>
<td>IND</td>
<td>−0.1281 (0.2243)</td>
<td>0.8249** (0.3453)</td>
<td>0.9189 (0.5741)</td>
</tr>
<tr>
<td>URBA</td>
<td>−0.5445*** (0.2031)</td>
<td>1.4227* (0.7359)</td>
<td>1.6943*** (0.5969)</td>
</tr>
<tr>
<td>ER</td>
<td>0.0111 (0.0756)</td>
<td>−0.1181 (0.2082)</td>
<td>0.0149** (0.0071)</td>
</tr>
<tr>
<td>FIN</td>
<td>−0.2497 (0.1773)</td>
<td>−0.1459 (0.2214)</td>
<td>−0.1581 (0.1179)</td>
</tr>
<tr>
<td>GOV</td>
<td>0.8393* (0.4821)</td>
<td>0.9682 (1.0067)</td>
<td>−1.6711** (0.7180)</td>
</tr>
</tbody>
</table>

Provincial fixed effect Y Y Y
Year fixed effect Y Y Y
Constant 1.5753*** (0.1561) | −0.5147 (0.4279) | 0.5530* (0.3163) |
Observation 228 171 171
R² 0.8134 0.6482 0.6886

Notes: Robust standard errors are in parentheses, and ***, ** and * indicate the significance level of 1%, 5%, and 10%, respectively. Moreover, the eastern region of China includes the following provinces: Hebei, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Beijing, Tianjin, Liaoning, Shanghai, Hainan, and Guangxi. The central region of China includes Shanxi, Hunan, Anhui, Hebei, Heilongjiang, Henan, Jiangxi, Jilin, and Neimenggu. The western part of China has Xinjiang, Qinghai, Ningxia, Gansu, Yunnan, Guizhou, Shaanxi, Sichuan, and Chongqing [52].

5.3.2. Competitive Intensity Heterogeneity

The government’s fiscal revenue and expenditure are essential factors affecting the government’s behavior. According to the existing research, local government competition is also manifested in the government’s fiscal revenue and expenditure [45]. Then, is heterogeneity in the effect of the local governments’ foreign investment competition on the EWP due to the intensity of the government’s fiscal revenue and expenditure competition? This paper analyzes subsamples grouped according to the two standards of governments’ fiscal expenditure and tax competition to explore the heterogeneous impact of fiscal revenue and expenditure competition. The experimental results are shown in Table 6.
Table 6. Heterogeneity in the intensity of fiscal revenue and expenditure competition.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Fiscal Expenditure Competition</th>
<th>Taxation Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>LEU</td>
<td>−0.0050 ***</td>
<td>−0.1326 ***</td>
</tr>
<tr>
<td></td>
<td>(0.0014)</td>
<td>(0.0351)</td>
</tr>
<tr>
<td>IND</td>
<td>0.5342</td>
<td>0.4655</td>
</tr>
<tr>
<td></td>
<td>(0.4035)</td>
<td>(0.4525)</td>
</tr>
<tr>
<td>URBA</td>
<td>1.3849 *</td>
<td>−0.2263</td>
</tr>
<tr>
<td></td>
<td>(0.7903)</td>
<td>(0.5764)</td>
</tr>
<tr>
<td>ER</td>
<td>0.0218 ***</td>
<td>−0.2012 *</td>
</tr>
<tr>
<td></td>
<td>(0.0064)</td>
<td>(0.1168)</td>
</tr>
<tr>
<td>FIN</td>
<td>0.0250</td>
<td>0.0404</td>
</tr>
<tr>
<td></td>
<td>(0.0982)</td>
<td>(0.2002)</td>
</tr>
<tr>
<td>GOV</td>
<td>−0.6937</td>
<td>1.0224</td>
</tr>
<tr>
<td></td>
<td>(0.4904)</td>
<td>(0.9942)</td>
</tr>
</tbody>
</table>

Provincial fixed effect | Y | Y | Y | Y | Y | Y |
Year fixed effect | Y | Y | Y | Y | Y | Y |
Constant | 0.5022 * | 1.4921 *** | 1.4629 *** | 1.6374 *** | 0.2568 | 0.2040 |
|           | (0.2634) | (0.4092) | (0.2019) | (0.1848) | (0.3845) | (0.2714) |
Observation | 190 | 190 | 190 | 190 | 190 |
R² | 0.7010 | 0.7325 | 0.7033 | 0.7371 | 0.7307 | 0.5858 |

Notes: ***, ** and * indicate the significance level of 1%, 5%, and 10%, respectively.

When tested according to the fiscal spending competition subgroup, the coefficient of governments’ foreign investment competition in both the high and medium fiscal spending competition sample groups is significantly negative at the 1% level. The regression coefficient of governments’ foreign investment competition is positive in the sample group with low financial expenditure competition, but the significance of the coefficient is not high. The low level of competition in government expenditure means that local governments have less financial expenditure to meet regional development. When the scale of local government’s financial capital expenditure is small, the introduced foreign investment makes up for the lack of public service supply caused by insufficient financial expenditure to a certain extent, which will bring about economic growth and the melioration of social welfare, and is conducive to the improvement of EWP.

According to the grouping of tax competition, in the sample groups with high and medium tax competition, the coefficient of governments’ foreign investment competition is significantly negative at 1%. The coefficient of governments’ foreign investment competition is significantly positive in the sample group with low tax competition. The above experimental results may occur because in areas with low tax competition, local governments rarely lower the threshold of attracting foreign capital and use preferential tax policies to attract foreign capital. Therefore, the introduction of high-quality green foreign capital not only brings less environmental pollution but also benefits regional economic development. At this time, foreign capital competition will be conducive to improving EWP.

Based on the above experimental results, we can make the following observations. There is heterogeneity in the effect of governments’ foreign investment competition on EWP when subsample regressions are conducted with the intensity of fiscal competition. When analyzed using the whole sample, governments’ foreign investment competition negatively affects EWP. In the subsamples with high and medium intensity of fiscal spending and tax competition, the regression results confirm that governments’ foreign investment competition is detrimental to EWP. In the subsample with low intensity of fiscal spending and tax competition, the regression results indicate that governments’ foreign investment competition will be beneficial to the improvement of EWP. Regions with low fiscal competition are usually less developed because of the lack of fiscal expenditure and tax revenue.
These regions’ economic development, education development, and living standards are not high, and thus their EWP is relatively low. Suppose the governments in these regions compete for foreign capital and introduce foreign capital: in that case, the primary use of such capital is to meet the needs of residents for life and education. Thus, in the extreme case of low fiscal competition, governments’ foreign investment competition will compensate for the lack of public finance role of the government and boost the EWP of the region. When there is foreign investment competition among local governments, the central government can influence the behavior of local governments by regulating local government revenue and expenditure. For example, the following measures can be taken: designing vertical matching transfer mechanisms, optimizing the fiscal ecological compensation system, and formulating asymmetric taxation policies, which will inhibit the possible “bottom-up competition” and thus maximize the national ecological welfare.

5.4. Further Discussion

Factors of production influence government competition and differences in resource endowment allocation among regions have led local governments to compete fiercely to introduce external regional resources [53,54]. Then, is the impact of governments’ foreign investment competition on EWP influenced by factor mobility? This paper explores the possible moderating impacts of factor mobility in the effect of governments’ foreign investment competition on EWP in three dimensions: capital mobility, technological mobility, and labor mobility.

Regarding capital mobility, capital is the basis of social production and determines the upper limit of regional economic development. Increased capital market activity due to capital mobility will significantly contribute to the increase in the scale and efficiency of production [55]. Improving capital liquidity allows for the rapid conversion of capital tied up in investments into liquidity. Flooding the market with liquid capital can compensate for the government’s needs in terms of foreign capital and weaken local governments’ need for foreign capital competition, thus weakening the negative impact of foreign capital competition on EWP.

Regarding technological mobility, technology usually flows from the technologically developed regions to the less developed areas. The less developed regions repeatedly absorb and test the technology after its introduction to achieve technological reinvention, thus bringing into play the technical dividend effect and promoting regional economic growth and the welfare level [56]. On the one hand, technological mobility can promote regional technological innovation, improve the allocation of factor resources, raise the marginal output rate of labor and capital, and facilitate governments’ foreign investment competition. On the other hand, the stronger the region’s ability to own and apply new technologies, the more it can attract FDI. As technological mobility increases, governments’ foreign investment competition will become more intense. Thus, technological mobility will strengthen the inhibitory effect of governments’ foreign investment competition on EWP.

In terms of labor mobility, on the one hand, enhancing labor mobility not only promotes the rational allocation of labor factors among regions and increases the amount of effective labor in each region [57] but also facilitates the integration of labor with capital, technology, and other factors [58]. Thus, strengthening labor mobility will improve foreign investment’s marginal productivity and motivate governments to increase the competition for FDI for regional economic growth. On the other hand, with the development of higher education in China, the labor force involved in mobility tends to have a higher level of education and productive dynamism. The knowledge spillover effects from high-quality labor mobility can more effectively leverage foreign investment, thus reinforcing the dampening effect of governments’ foreign investment competition on EWP.

The above analysis shows that capital mobility weakens the negative impact of governments’ foreign investment competition on EWP, while technological and labor mobility strengthen the negative influence of governments’ foreign investment competition on EWP.
In this paper, to test the interaction effects of capital mobility, technological mobility, and labor mobility with governments’ foreign investment competition, we included one period lag of the cross term of governments’ foreign investment competition and capital mobility, technological mobility, and labor mobility in Equations (4)–(6) in turn, and conducted regression analysis using a double fixed effects panel model. Table 7 presents the relevant experimental results.

Table 7. Test for moderating effects.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) EWP</th>
<th>(2) EWP</th>
<th>(3) EWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.ECU</td>
<td>−0.0063 ***</td>
<td>−0.0042 ***</td>
<td>−0.0038 ***</td>
</tr>
<tr>
<td></td>
<td>(0.0008)</td>
<td>(0.0008)</td>
<td>(0.0011)</td>
</tr>
<tr>
<td>L.(CAP × ECU)</td>
<td>0.0119 ***</td>
<td>0.0091 **</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0036)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>L.(TEC × ECU)</td>
<td>−0.0091 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.(LAP × ECU)</td>
<td>−7.8739 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.5763)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control variables</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Provincial fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Constant</td>
<td>1.1806 ***</td>
<td>1.1676 ***</td>
<td>1.3638 ***</td>
</tr>
<tr>
<td></td>
<td>(0.1565)</td>
<td>(0.1634)</td>
<td>(0.1556)</td>
</tr>
<tr>
<td>Observation</td>
<td>570</td>
<td>570</td>
<td>570</td>
</tr>
<tr>
<td>R²</td>
<td>0.7109</td>
<td>0.6989</td>
<td>0.6988</td>
</tr>
</tbody>
</table>

Notes: *** and ** indicate the significance level of 1% and 5%, respectively.

Based on the experimental results in Table 7, we can draw the following conclusions.

First, the regression coefficient of the cross term of governments’ foreign investment competition and capital mobility is significantly positive at the level of 1%, which is opposite to the sign of the regression coefficient of governments’ foreign capital competition, indicating that increasing capital mobility can help alleviate the restraining effect of governments’ foreign investment competition on the improvement of EWP. The experimental results also illustrate that accelerating domestic capital mobility across regions can compensate for the need for foreign investment competition, thus weakening its negative effect on EWP.

Second, the regression coefficient of the cross term between governments’ foreign investment competition and technological mobility is significantly negative at the 5% level. The interaction term coefficient remains consistent with the regression coefficient of governments’ foreign investment competition, indicating that technological mobility reinforces the inhibitory effect of governments’ foreign investment competition on the improvement of EWP. There is a synergistic effect between governments’ foreign investment competition and technological mobility. Accelerating the rate of technology diffusion and mobility across the region can increase the marginal output rates of labor and capital, thus prompting the local government to expand its demand for foreign capital further and intensify the level of governments’ foreign investment competition. The interaction of technology mobility and governments’ foreign investment competition is detrimental to the enhancement of EWP.

Third, the regression coefficient between governments’ foreign investment competition and labor mobility is significantly negative at the 5% level, indicating that labor mobility enhances the negative impact of governments’ foreign investment competition on EWP. Accelerating the speed of labor mobility can enable the optimal allocation of labor resources among regions, promote labor integration with factors such as technology and capital, and create greater production capacity for regions. The considerable surplus capacity will prompt local governments to increase the intake of capital and other factors of production, making the competition for foreign investment more intense. Thus, the interaction between
labor mobility and governments’ foreign investment competition is equally damaging to improving EWP.

Overall, capital mobility weakens the inhibitory effect of governments’ foreign investment competition on the enhancement of EWP, while technological and labor mobility reinforce the negative effect of governments’ foreign investment competition on EWP. The differences in the effects of the interaction between governments’ foreign investment competition and different resource factor mobility provide policymakers with references and guidance for decision-making. The central government should accelerate the promotion of capital factor mobility while guiding the reasonable flow of technology and labor factors to green industries so that resource factors can serve green development to promote the improvement of EWP.

6. Conclusions and Recommendations

Local governments’ behavior in China is strongly influenced by the political and economic structure in which it is embedded. Local governments’ foreign investment competition critically impacts EWP, covering the multidimensional connotations of economic development, the ecological environment, and social well-being. This paper empirically analyzes the effects of governments’ foreign investment competition on EWP using the panel data of 30 Chinese provinces and cities from 2001 to 2020. The relevant findings are as follows:

• From the whole sample, governments’ foreign investment competition has a significantly negative effect on EWP (i.e., an increase in the degree of governments’ foreign investment competition is detrimental to the improvement of EWP). This finding passed an endogeneity test and a series of robustness tests; the results indicate that the findings are robust.

• The effect of governments’ foreign investment competition on EWP also exhibits heterogeneity. Governments’ foreign investment competition has a significantly inhibitory impact on EWP in the eastern and western regions of China, but this impact on EWP in the eastern area is not significant. The effect of governments’ foreign investment competition on EWP shows a significantly inhibitory impact under a medium- and high-level intensity of fiscal expenditure and tax competition, but it significantly promotes EWP under a low-level intensity of fiscal expenditure and tax competition.

• Resource factor mobility has a significantly moderating effect on the impact of governments’ foreign investment competition on EWP. Capital mobility weakens the inhibitory effect of governments’ foreign investment competition on the enhancement of EWP, while technological and labor mobility strengthen the adverse effects of such competition on EWP.

Based on these findings, we believe that we can make the following suggestions to circumvent the phenomenon whereby local governments’ inappropriate competitive behavior in attracting foreign investment inhibits the enhancement of EWP.

1. A diversified performance appraisal mechanism to guide local governments to compete in a more healthy manner should be established. The performance appraisal standard is the “guideline” that determines local governments’ behavior. Local governments have long competed for growth, ignoring the environmental pollution caused by competitive behavior. Therefore, to alleviate the inhibitory effects on EWP of governmental foreign investment competition, the central government should pay sufficient attention to regional economic development, the ecological environment, and social welfare in its performance appraisal of local governments. At the same time, the state should encourage local governments to consider the governmental linkage effect and mutual benefits when introducing foreign investment, to strengthen interregional cooperation and exchange and establish an interactive relationship of competition and collaboration. The central government should prevent vicious competition between local governments for resources, establish a benign competitive relationship of “seeing the wise and striving for the best”,

Sustainability 2022, 14, 12903
and strictly control the undesired environmental consequences caused by competition between local governments for foreign investment.

2. We should change the local governments’ foreign investment attraction policy approach and focus on introducing high-quality foreign investment. Although local government foreign investment competition hurts EWP, we cannot deny the positive effect of FDI on EWP. Therefore, on the one hand, the central government should establish sound laws and regulations governing the introduction of foreign investment, set minimum environmental standards for local governments in the process of foreign investment competition, and regulate the behavior surrounding the introduction of investment. On the other hand, local governments also need to abandon the developmental concept of “emphasizing economic growth and ignoring environmental protection” and establish the ecological performance concept of “green water and green mountains are golden mountains and silver mountains.” In attracting foreign capital, local government should control the quality of foreign capital and provide specific policy encouragement and tax incentives to environmentally friendly FDI. At the same time, the central government should increase the review of foreign investment introduced by local governments and prohibit the introduction of foreign investment that is contrary to the improvement of EWP.

3. We should adapt to local conditions and avoid a “one-size-fits-all” policy design. The negative impact of governments’ foreign investment competition on EWP is not only regionally heterogeneous but heterogeneous in terms of various intensities of fiscal spending and tax competition. Therefore, policymakers should consider the effects of governments’ foreign investment competition on EWP under other circumstances. The central government should consider the regional differences between eastern, central, and western China when designing policies to introduce foreign investment and formulate asymmetric tax policies to curb possibly unhealthy competition. Meanwhile, ecological transfer payment is vital to environmental governance dilemmas and can alleviate vicious competition among regions. The central government should comprehensively consider the degree of competition between regional governments’ fiscal revenue and expenditures and establish a unique transfer payment system. For regions with low competition in fiscal balance, governments’ foreign investment competition is conducive to enhancing EWP. At this time, the central government should encourage them to participate in competition and introduce environment-friendly foreign investment within a reasonable range. Moreover, the central government should optimize the pattern of local governments’ competition for fiscal revenue and spending and encourage fiscal revenue and expenditures that promote green development and regional EWP.

4. The synergistic effects of factor mobility and local foreign investment competition should be emphasized. Local governments should accelerate their promotion of regional capital flows and improve capital use efficiency to alleviate the inhibitory effect of foreign capital competition on EWP. Then, the central government should encourage the development of green investment and financing through preferential policies, strengthen the guidance of capital investment direction, and constantly improve legislation that promotes the orderly flow of capital and deepens the positive impact of capital flow on the promotion of EWP. At the same time, the central government should accelerate the advancement of technological innovation and sharing, increase investment in education to improve the quality of labor, guide technology and labor to flow into environmentally friendly industries and fields, and avoid technology and labor serving “high energy consumption and high pollution” industries, which will damage EWP.

Although this study preliminarily explores the relationship between governments’ foreign capital competition and EWP using ordinary regressions and provides valuable empirical evidence for other developing countries that are eager to open themselves to the outside world, it still features some limitations. First, the data sample in this research involves only 20 years of provincial-level data. Second, this study does not explore the possible spatial spillover effects of governments’ foreign investment competition on EWP. Therefore, future research may be conducted based on more extensive sample data, for example, city-
or county-level data. At the same time, governments' foreign investment competition involves different individual governments among regions, which can be extended to the research scope of spatial economics. So, follow-up research may continue to study this problem using measurement methods such as spatial Durbin and autoregressive models.

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