



# Reducing administrative barriers: Evidence from China's county-to-district reform on export product quality

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## ABSTRACT

High administrative barriers can increase the flow costs of factor resources, reduce the efficiency of resource allocation, and potentially impede China's transition towards a high-quality development stage. This paper uses China's county-to-district reform as a quasi-natural experiment to examine how reducing inter-regional administrative barriers influences firms' product quality. Based on panel data from 2000 to 2013, which encompasses Chinese industrial enterprises, customs, and patents, the study finds that the county-to-district reform can significantly improve the quality of export products of firms within the reform counties. Further exploration of the mechanisms reveals that, on the one hand, the reform forces firms to concentrate more on producing competitive, high-quality products due to the tightening of preferential policies and increasing financial constraints. On the other hand, the reform can increase firm agglomeration, which encourages firms to innovate through knowledge spillovers and fiercer competition, thus enhancing the quality of export products. In addition, the reform improves the administrative efficiency of local governments in handling firms' export activities and reduces transaction costs for firms, which improves their export product quality. The results on firm heterogeneity show that the effect of this reform on quality upgrading is particularly evident in non-state-owned enterprises, high-efficiency enterprises, and those in the less marketized regions.

## 1. Introduction

Over decades, China's economy has witnessed remarkable growth, which is largely attributed to the 'Chinese-style decentralization' characterized by economic decentralization and political centralization (Cai & Treisman, 2006; Qian & Roland, 1998; Xu, 2011; Xu & Qian, 1993; Zhang, 2006). Within this framework, local governments are both motivated—for political promotion of local leaders and enhancement of fiscal revenue—and empowered with more autonomous administrative authority—such as the power to approve land expropriation, manage debt financing, and implement fiscal and tax policies to attract investment—to vigorously pursue economic growth within their jurisdictions (Gao, 2009; Li & Zhou, 2005; Ma, 2016; Que et al., 2019; Yao & Zhang, 2015). The Chinese-style decentralization played a crucial role in the

rapid expansion of China's total economic volume. Local governments seized the window of opportunities during the global trade boom and the globalization of production, attracting substantial foreign investment and facilitating rapid growth of domestic firms. As local economies have burgeoned, so too has China's economy as a whole.

Decentralization, however, is not devoid of negative impacts on economic development. Studies from many developed countries have shown that decentralization can lead to the elevation of inter-regional barriers, resulting in vicious competition and local protectionism, which is detrimental to market integration and specialization (Eyer & Kahn, 2017; Ramondo et al., 2016; Wolf, 2000). In China, during the past decades, the detrimental effects of these administrative barriers have been overshadowed by rapid economic growth and received limited attention in practice and academia. Recently, China's era of

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high-speed growth has reached a turning point, with the current focus shifting towards achieving high-quality economic development and enhancing international competitiveness. Improving the quality of export products is a top priority in this effort. Despite rapidly expanding its export scale since joining the WTO in 2001, the quality of China's export products remains relatively low, significantly lagging behind trade powerhouses such as the United States and Germany (Feenstra & Romalis, 2014). As labor costs rise, China is gradually losing the price advantage, making the improvement of export product quality and competitiveness increasingly urgent. At this stage, the obstructive effects of economic decentralization and regional barriers on high-quality economic development, particularly on the improvement of export product quality have gradually surfaced.

This fragmentation of the domestic market hinders the realization of a large domestic market effect and the achievement of economies of scale (Tang & Hewings, 2017; Young, 2000). These administrative barriers inflate the costs associated with the cross-boundary movement of production factors and goods and lower the efficiency of resource utilization. This can inhibit the development of local comparative advantages and the achievement of production specialization over a larger region. Ultimately, this hampers the enhancement of product quality, inevitably affecting the quality of export products as well. Although export products and domestic products target different markets, regional administrative integration can influence the quality of both from a production perspective. This is achieved by reducing local government protectionism, promoting business clustering, and enhancing government service efficiency. Moreover, heterogeneous trade theory has shown that exporting firms are more efficient and produce higher-quality products. By significantly improving the production environment and reducing production costs, regional integration enhances the quality of export products.

In previous research, the accurate measurement of impacts of administrative barriers has always been challenging, leading to a scarcity of empirical studies. This paper employs China's county-to-district reform as a quasi-natural experiment to explore whether the reduction of administrative barriers can significantly enhance the quality of firms' export products. Similar reforms of regional consolidation have been implemented in countries such as Germany, Denmark, Finland, the Netherlands, Sweden, and Israel. Studies in these contexts have mainly focused on effects of urban scale and changes in fiscal revenues and expenditures (Blesse & Baskaran, 2016; Blom-Hansen et al., 2014; Moiso & Uusitalo, 2013; Allers & Geertsema, 2016; Hanes, 2015; Reingewertz, 2012). However, China's reform is distinct from these examples as it is centered on the redistribution of government power across different administrative levels, characterized by the centralization of authorities such as land approval, fiscal management, and administrative governance. Under this reform, counties or county-level cities, which were formerly more autonomous, are integrated into prefecture-level government jurisdictions, leading to the amalgamation of their fiscal and administrative powers into prefecture-level governments. The county-to-district reform shifts the relationship between the county and its prefecture-level government from primarily competitive to highly aligned in terms of interests. This significantly diminishes the administrative barriers between counties and prefectures, potentially enhancing resource allocation efficiency and thereby improving the quality of firms' export products.

The quality of export products is a crucial indicator of a country's international competitiveness (Bas & Strauss-Kahn, 2015). In recent years, due to escalating trade frictions, increasing international competition, and advances in international trade theory and its methodology, there has been a surge in scholarly discussions on the quality of firms' export products. Research on factors affecting export product quality provides valuable insights from the perspective of firms' internal factors. It is generally believed that firms' technological improvements positively affect the quality of export products (He & Tang, 2023; Wu et al., 2023; Yang et al., 2023; Zhang et al., 2023), while deterioration in

financial conditions has a negative impact (Bernini et al., 2015; Ciani & Bartoli, 2020). In addition to internal factors, the market and institutional environment in which a firm operates can also affect product quality. Some studies have also pointed out that government tax incentives leading to expanded production scales and export expansion might reduce human capital investment, thereby lowering the quality of export products (Kong & Xiong, 2021). Current research has not extensively examined the impact of inter-regional administrative barriers on the quality of firms' export products, nor has it specifically focused on the potential quality enhancement effects of the county-to-district reform. However, as previously discussed, this perspective is crucial for understanding the institutional obstacles to improving firms' product quality within the context of China's unique stage of development.

Compared to existing literature, the potential contributions of this paper are threefold: First, it tries to address the gap in understanding administrative barriers in China. The literature in the context of Western economies has focused on the effects of lowering administrative barriers on urban scale economies and changes in fiscal revenues and expenditures, exploring the economic growth effects of market integration from a market economy perspective. In the context of China, studying the impact of inter-regional administrative barriers necessitates a deep understanding of decentralization. Most studies on Chinese decentralization often praise its role in mobilizing local government initiatives and thereby creating the miracle of China's economic growth. However, recent studies have found that decentralization also leads to higher inter-regional administrative barriers, which hinder economic growth. During China's transition to high-quality development, these studies have not adequately explored the specific impact of administrative barriers on the quality of economic development. This paper addresses this gap by employing China's county-to-district reform as a quasi-natural experiment to investigate whether reducing administrative barriers can significantly enhance the quality of firms' export products. By doing so, it supplements existing research on market integration, decentralization, and administrative barriers, providing valuable insights into the institutional challenges that hinder the enhancement of product quality in Chinese firms.

The second contribution is to explore underlying mechanisms behind the relationship between the county-to-district reform and quality of firms' export products. While previous studies have acknowledged the broad impacts of administrative reforms, they have not sufficiently examined the specific mechanisms through which these reforms affect firms' export product quality. This paper makes a significant contribution by exploring three key mechanisms. The analysis reveals that the reform reduces local protectionism and increase financial constraints compelling firms to adjust their product mix towards more competitive, high-quality products. It also fosters firm agglomeration within urban districts and counties, which stimulates innovation and enhances product quality. Additionally, the reform improves the administrative efficiency of local governments, thereby reducing transaction costs for firms. By identifying these mechanisms, the paper clarifies the channels through which the reform enhances product quality and provides practical policy implications for both firms and governments seeking to improve competitive performance in the global market.

Finally, this paper also contributes to the literature by the firm-level analysis and micro-mechanisms. Most previous research has been conducted at the county level, focusing on the effects of reforms on county-level economic growth and fiscal changes. While these studies provide useful macro-level insights, they often overlook the micro-level dynamics that drive firm behavior and performance. This paper shifts the focus to the firm level, examining how the county-to-district reform affects firms' behavior and performance. By delving into the micro-mechanisms, it elucidates how the reform influences firms' decision-making processes, competitive strategies, and product quality. Furthermore, the paper explores the heterogeneous effects of the reform, showing that its impact varies across different types of firms, such as

non-state-owned enterprises, high-efficiency firms, and firms in regions with low levels of marketization. This firm-level analysis not only enhances our understanding of the reform's impacts but also provides a more nuanced view of its implications for heterogeneous firms.

The structure of the paper is as follows. The second section discusses the reform background and research hypotheses, the third section outlines the empirical strategy, the fourth section analyzes the empirical results, and the fifth section presents the conclusions and discussions.

## 2. Theoretical analysis and hypotheses

### 2.1. The county-to-district reform

In China, a unique juxtaposition of economic decentralization and political centralization empowers local governments to exert significant market intervention. This results in high administrative barriers and local protectionism across regions, manifested in several ways: competition with neighboring regions to attract foreign investment, hindering the outflow of local firms, providing subsidies for consumers purchasing local products, raising institutional thresholds for the entry of non-local products into local markets, restricting labor mobility due to household registration systems, and showing local biases in government procurement processes (Poncet, 2005; Tombe & Zhu, 2019; Barwick et al., 2021).

The county-to-district reform is a crucial component of administrative division adjustments in China. Under the central government, the country's administrative hierarchy comprises four levels: province, prefecture, county, and township. Counties encompass both agricultural counties and county-level cities. Urban districts, falling under the jurisdiction of prefecture-level cities, are on the same administrative tier as counties but exhibit significant differences in terms of administrative authority, functional scope, and fiscal powers. Notably, county-level cities and agricultural counties wield greater administrative power and have control over more resources. They enjoy more autonomy in approving construction land and crafting investment attraction policies (Lu et al., 2024). In contrast, urban districts, as administrative divisions within prefecture-level cities, are economically and socially managed by their respective prefecture-level governments. Their fiscal revenues are handed over to these governments, and their expenditures depend on allocations from the same, resulting in less autonomy for the urban districts. Counties are either managed directly by the provincial government or supervised by the prefecture government on behalf of the province. This form of decentralization creates high administrative

barriers between counties and urban districts, leading to their competition over resources, projects, and talents.

In order either to promote urbanization or to lower administrative barriers to enhance market integration, China implemented the county-to-district reform. This reform entails transforming agricultural counties or county-level cities into urban districts under the jurisdiction of prefecture-level cities, contingent upon meeting specified conditions and obtaining approval from relevant authorities. As a result of the reform, the powers concerning land approval, fiscal management, and administrative governance are transferred from the reformed county to the prefecture government, marking a shift from decentralization to centralization within the prefecture-level city. Historically, the policy of converting counties to urban districts began in the late 1960s, with a surge in the number of such conversions following the release of the "Report on Adjusting City Establishment Standards" in 1993. However, due to data accessibility limitations regarding the quality of firms' export products, this study is confined to the period between 2000 and 2013. There were two waves of reform during this period, from 2001 to 2004 and from 2011 to 2013. A total of 82 counties and county-level cities underwent this reform, as detailed in Fig. 1.

### 2.2. The theoretical analysis

#### 2.2.1. The impact of county-to-district reform on the quality of firms' export products

The county-to-district reform, which transforms counties into urban districts under the jurisdiction of prefecture-level cities, results in significant changes in financial revenue authority and governmental expenditure responsibilities. Generally, district governments, as subdivisions of the prefecture-level government, fully comply with its directives and policies. In contrast, counties, while supervised by the prefecture city, are subordinate to the provincial government and have broader economic management authority and greater fiscal autonomy compared to urban districts.

Specifically, regarding fiscal revenue, urban districts, being integral parts of the prefecture-level city, usually demonstrate a strong financial dependency on the prefecture-level government, which somewhat diminishes urban districts' fiscal independence. Under the tax-sharing system, urban districts are required to share tax revenues with the prefecture-level city. On one hand, urban districts have relatively limited authority in tax collection, particularly for taxes from foreign and joint ventures and government penalty revenues, which are typically remitted first to the prefecture-level city before redistribution. On

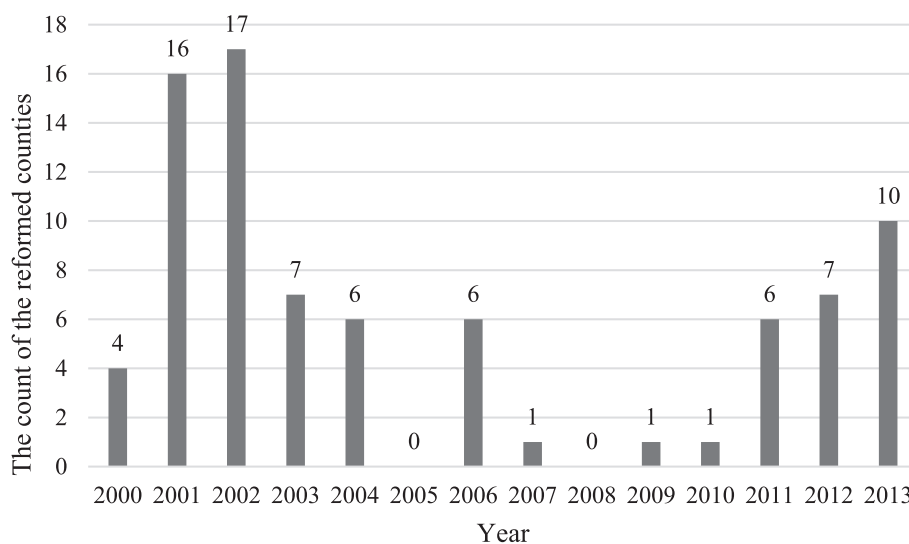


Fig. 1. The number of counties implementing the county-to-district reform from 2000 to 2013. Note: compiled based on the official website of China's administrative divisions.

the other hand, urban districts also need to share land transfer revenues with the prefecture government. Consequently, the transition from a county to a district markedly reduces the government's autonomy in fiscal revenue.

When considering governmental expenditure responsibilities, counties and districts diverge in their duties and strategies for allocation. Counties typically bear more responsibility particularly in promoting local economic growth and addressing rural issues, underlining their crucial role in economic development and thus incurring higher fiscal expenditure responsibilities. In contrast, districts focus more on public services and infrastructure. Their economic development functions often upward transferred to the prefecture government, thus concentrating their fiscal expenditures more on public expenditures. Hence, the transformation of a county into a district brings about significant changes in administrative authority and fiscal powers, which potentially impact the behavior and performance of export firms within its jurisdiction. Specifically, due to the weakened functions in economic development and the reduction in fiscal powers post-reform, governments are less motivated and able to continue implementing support policies for firms. This compels export firms to proactively enhance their product quality to maintain export competitiveness (Meng et al., 2020; Sui et al., 2022).

In addition, it is generally believed that an integrated domestic market enhances the competitiveness of export firms. On the one hand, the local market effect, meaning a vast domestic market, helps local firms achieve economies of scale. Cost reductions and efficiency improvements form a solid foundation for firms to gain export competitiveness (Linder, 1961). Specifically, a larger local market will attract more firms to cluster, and the resulting knowledge spillover effects will further reduce R&D costs and innovation risks (Garcia-Vega, 2006). On the other hand, local market integration also promotes refined division of labor and specialized production, thereby reducing production costs and improving the quality of export products. However, the benefits of China's massive market have yet to be fully realized, mainly due to severe domestic market fragmentation, which prevents the maximization of economies of scale. The county-to-district reform can diminish administrative barriers between the reformed counties and urban districts (Allers & Geertsema, 2016; Reingewertz, 2012), and the resultant higher level of market integration fosters economies of scale and regional specialization. This collaboration among production factors and products over a larger region can potentially improve production efficiency and export product quality. Therefore, we propose the following hypotheses:

**Hypothesis 1.** The transformation of a county into a district can improve the quality of export products of firms within its jurisdiction.

### 2.2.2. The mechanisms behind the effects of the county-to-district reform

**2.2.2.1. Financial constraints and product mix adjustment.** On one hand, the county-to-district reform has altered the fiscal expenditure structure of the reformed counties, shifting the focus from "economic development-oriented" expenses to more "public welfare-oriented" expenditures. Furthermore, after a county is incorporated as a urban district into the prefecture city, the important of economic growth rate in the assessment of official performance has decreased. Therefore, the change in government functions and performance evaluation criteria set by superior governments has reduced the reformed counties' motivation to intervene in economic affairs and implement local protectionism (Yuan et al., 2022). On the other hand, the reform has transformed the financial system of the original county government from being relative independent to being more dependent on the prefecture government. After deductions for central and provincial tax sharing, a significant portion of tax revenue is remitted to the prefecture governments, diminishing the capacity of the original county governments to intervene in economic development. Consequently, the original county government's ability to

allocate resources such as subsidies, loans and tax incentives to firms is reduced (Han & Wu, 2024). The decline of preferential policies may increase the financial burden on firms within its jurisdiction.

From a positive perspective, when facing financial constraints, firms tend to allocate resources more cautiously. On the one hand, these firms often work towards reducing their reliance on external financing by introducing cost-saving management innovations, with the goal of cutting expenses and improving efficiency. This, in turn, contributes to fostering their own growth (De Blick et al., 2023). On the other hand, the focus is on product competitive strategies. The market for low-end products is usually highly competitive with lower profits. Especially in the export market, where the minimum pricing among firms is similar, only by improving product quality can a competitive advantage be gained (Eckel et al., 2015). High-quality products, which usually have fewer competitors, can often command higher prices and access larger markets, resulting in higher profits. With limited funds, firms might abandon low-quality products and concentrate resources on producing high-quality products. Meanwhile, firms with low production efficiency and difficulty obtaining funds for product upgrading may lose their international competitiveness (Ciani & Bartoli, 2020).

From a negative perspective, the county-to-district transformation leads to reduced policy support and decreased access to credit for firms. The inadequacy of external financing channels can hinder their business expansion (Motta, 2020). Specifically, when faced with sudden financial challenges, firms may prioritize maintaining operations, consequently reducing investments in high-cost, high-risk R&D activities (Bernini et al., 2015). This also could prompt export firms to implement cost-cutting measures and engage in price competition strategies, such as reducing the purchase of high-quality intermediate products, cutting back on innovation and advertising expenses, potentially resulting in the production and export of lower-quality products (Fan et al., 2015). Moreover, under the condition of the compressed profit margins, the additional cost of adjusting production processes may hinder firms from dropping highly polluting and less competitive products (He & Tang, 2023). This implies that financing constraints may also impede the enhancement of firms' export products (Ciani & Bartoli, 2020). Therefore, we propose the following hypotheses:

**Hypothesis 2a.** The county-to-district reform is likely to increase financial constraints for firms. Firms may be compelled to abandon low-quality products and focus on exporting high-quality products with comparative advantages.

**Hypothesis 2b.** The county-to-district reform is likely to increase financial constraints for firms. Firms may be compelled to resort to cost-cutting and low-end competitive strategies.

**2.2.2.2. Agglomeration and innovation.** The county-to-district reform transfers the administrative jurisdiction of the reformed county to the prefecture government, thereby lowering the administrative barriers between urban districts and counties. This promotes market integration and accelerates the flow of production factors such as capital, labor, and technology. Given that counties are typically located on the peripheries of cities and characterized by lower labor costs and land prices, a marked reduction in administrative barriers may attract firms into the new urban districts.

This may lead to two potential effects: Firstly, the entry of a large number of firms creates agglomeration effects and economies of scale, particularly when export firms with higher efficiency enter, bringing knowledge spillover and enhancing the technological innovation capabilities of local firms, thereby improving the quality of their export products. The knowledge spillover effect and the innovation effect of firm agglomeration are confirmed in the theoretical and empirical research on Marshallian externalities (Audretsch & Feldman, 1996; Ellison et al., 2010; Feldman & Audretsch, 1999; Henderson, 2003). Secondly, the increased number of firms intensifies competition

between firms for local production factors. The fierce competition compels firms to become more specialized in innovation activities, enabling them to develop profitable business models (Zheng & Du, 2020). Besides, market selection mechanisms could result in the elimination of low-efficiency firms that had previously benefited from local protectionism, thereby reallocating production factors towards more efficient firms and enhancing the overall regional allocation of innovation resources. Under the combined effect of knowledge spillovers and intensified competition, whether voluntarily or forcibly, firms may enhance their innovation capabilities in order to gain a larger export market or maintain their existing production profits, ultimately leading to an improvement in export product quality.

Many studies have proven that firms' technological innovation can improve product quality. Specifically, technological innovation can optimize the allocation of resources within a firm, thereby enhancing productivity and enabling firms to meet higher market thresholds (Wu et al., 2023). These markets often command higher prices and have stringent product requirements. Technological innovation boosts productivity by equipping firms with stronger quality control capabilities and directly improving the quality of export products through enhanced production process (Yang et al., 2023; Zhang et al., 2023). Additionally, by adjusting the product structure, technological innovation drives firms to create new products and phase out old ones, leading to higher product prices and larger market shares, thereby improving the overall quality of export products (He & Tang, 2023). Therefore, we propose the following hypotheses:

**Hypothesis 3.** The county-to-district reform, by increasing firm agglomeration level in reformed counties, promotes firms' innovation, ultimately improving the quality of export products.

**2.2.2.3. Administrative efficiency and transaction costs.** The county-to-district reform transfers the administrative jurisdiction of counties to the municipal government, shifting the primary functions of former county governments from economic development to public service. Specifically, the departments responsible for handling business export operations include the Bureau of Commerce and Customs. Customs is a government public service typically established by municipal governments, whereas most county-level governments do not have customs departments.

To ensure the fulfillment of this public service function, two changes occur after the county is merged into the prefecture-level city: Firstly, institutions such as the Bureau of Commerce, previously under the jurisdiction of county governments, become branches of the municipal Bureau of Commerce. This relatively centralized approach facilitates the municipal government's overall coordination of foreign trade operations (Tang & Hewings, 2017). Secondly, the procedures that previously required county-level reporting and municipal approval are now simplified. Firms can directly handle enterprise registration, processing trade, and customs clearance services at the municipal customs. This shortens the clearance time, reduces clearance costs, and speeds up the clearance process. Therefore, the reform reduces coordination costs, optimizes the provision of export services by the municipal government, enhances the administrative efficiency of local governments in handling business export activities, and lowers transaction costs for firms.

Additionally, the reform reduces the former county governments' willingness and ability to favor firms within their jurisdiction, weakening the connection between the former county governments and firms, thereby improving the business environment and mitigating local protectionism (Yuan et al., 2022). The improvement in the business environment can reduce government interference in firms, which means that firms can save funds previously spent on public relations, fees, or rent-seeking by officials (Dong et al., 2016), allowing them to allocate more funds to productive expansion or research and development. Therefore, the improvement in the business environment and administrative efficiency brought about by the county-to-district reform can

reduce transaction costs for firms, enabling them to allocate more funds to product production, thereby improving the quality of export products.

**Hypothesis 4.** The county-to-district reform improves the quality of export products by reducing transaction costs for firms.

### 3. Methods

#### 3.1. Model specification

To test if the county-to-district reform can improve the quality of export products of firms within its jurisdiction (Hypothesis 1), we run the following econometric model:

$$\text{Quality}_{it} = \beta_0 + \beta_1 \text{Policy}_{it} + \beta_2 C_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Quality<sub>it</sub> represents the quality of export products of firm *i* in year *t*. Policy<sub>it</sub> is a dummy variable used to represent the implementation of the county-to-district reform. If the county in which a firm is located is listed for this reform in year *t*, the variable is assigned a value of 1 for year *t* and all subsequent years; otherwise, it is assigned a value of 0. The estimated result of β<sub>1</sub> represents the policy effect. If the coefficient β<sub>1</sub> is >0, it indicates that the reform has a positive effect on export upgrading of firms. Conversely, if the coefficient β<sub>1</sub> is <0, it indicates a negative effect. C<sub>it</sub> represents control variables at the firm level, including the firm's age, size, asset-liability ratio, operating profit margin, leverage ratio, and government subsidies. The measurement of these variables is as follows: (1) Firm Age is calculated as the current year minus the year of establishment. (2) Firm Size is represented by the logarithm of the firm's total assets. (3) Firm Asset-liability Ratio is measured by the ratio of the firm's total liabilities to its total assets. (4) Firm Operating Profit Margin is measured by the ratio of the firm's operating profit to its main business sales revenue. (5) Firm Leverage Ratio is measured by the ratio of the firm's total assets to the sum of owner's equity. (6) Government Subsidy is a dummy variable. If a firm has subsidy income, assign a value of 1; otherwise, assign a value of 0. μ<sub>*i*</sub> and λ<sub>*t*</sub> respectively represent firm fixed effects and time fixed effects, while ε<sub>*it*</sub> represents the random disturbance term.

#### 3.2. Measurement of the variables

##### 3.2.1. The quality of firm's export products

Following Amiti and Khandelwal (2013), Gervais (2015) and Roberts et al. (2012), we define the consumption amount of products exported by firm *f* to consumer *c* in importing country in year *t* as:

$$q_{fct} = P_{fct}^{-\sigma} \lambda_{fct}^{\sigma-1} \frac{E_{ct}}{P_{ct}} \quad (2)$$

Taking the natural logarithm, we obtain:

$$\ln q_{fct} = (\ln E_{ct} - \ln P_{ct}) - \sigma \ln P_{fct} + \varepsilon_{fct} \quad (3)$$

where, (lnE<sub>ct</sub> - lnP<sub>ct</sub>) represents the country-year dummy variables, respectively controlling for variables that change with country and time. q<sub>fct</sub> denotes the price of the products that firm *f* exports to country *c* in year *t*, and ε<sub>fct</sub> is the residual term, which contains information about the quality of the firm's exported products. Adopting the approach of Khandelwal (2010) and accounting for endogeneity issues, we measure the quality of products exported by firm *f* to country *c* in year *t* as:

$$\text{Quality}_{fct} = \frac{\hat{\varepsilon}_{fct}}{\sigma - 1} = \frac{\ln q_{fct} - \ln \hat{q}_{fct}}{\sigma - 1} \quad (4)$$

In eq. (4), σ is set to 4, referencing Broda and Weinstein (2006). After standardizing the quality of exported products to create a unitless index, this index is further weighted by the firm's export value and summed to yield the quality of products exported by firm *f* in year *t*.

### 3.2.2. The other variables

To verify whether the county-to-district reform affects a firm's product mix adjustment by altering its financial constraints ([Hypothesis 2a and 2b](#)), this study adopts the Tax Burden and Capital Liquidity as measures of the firm's financial constraints. Specifically, the Tax Burden is measured by the proportion of income tax payable to operating profit, which can reveal the preferential tax policy on the firms. The Firm Capital Liquidity is calculated as the difference between total current assets and total current liabilities, divided by total assets. This indicator can reflect the proportion of cash and liquid assets available to a firm during its operations relative to short-term liabilities, thereby evaluating the firm's liquidity. Finally, we use the proportion of high-quality products in exporting firms as an indicator of their product mix adjustment. Should the reform markedly increase this proportion, it will confirm [Hypothesis 2a](#); if not, [Hypothesis 2b](#) will be substantiated.

To prove [Hypothesis 3](#), which posits that the reform can lead to an improvement in a firm's product quality by enhancing firm agglomeration and thereby promoting the firm's innovation, we measure Firm Agglomeration as the number of export firms operating within the same sector and county. Generally speaking, a greater number of firms indicates higher economics of scale and more intense market competition. We use the number of invention-type patents to measure a firm's and innovative performance. It is commonly believed that invention-type patents can reflect a firm's innovative capability more accurately compared to design patents and utility model patents. Both variables apply the logarithmic transformation. To verify whether the reform can reduce transaction costs for firms, thereby improving the quality of their export products ([Hypothesis 4](#)), we use the ratio of a firm's administrative expenses to its revenue from the sales of its main business products, as a proxy for transaction costs. The variable definition is provided in [Table A1](#) of the appendix.

### 3.3. Data

This study utilizes matched data from three datasets: China's Annual Survey of Industrial Firms (ASIF), the Chinese Customs Trade Statistics (CCTS), and China's State Intellectual Property Office (SIPO) patent database, spanning from 2000 to 2013. Firms lacking organization codes have been excluded. Concerning outliers, we calculate the mean and standard deviation for the variables, define values exceeding 3 times the standard deviation from the mean as outliers, and remove the observations beyond this threshold. [Table 1](#) presents the descriptive statistics of the variables. Before estimating the econometric model, we first describe the differences between the treatment group and the control group in terms of the quality of firms' export products, respectively before and after the reform. As shown in [Table 2](#), before the reform, the difference between the experimental group and the control group was not statistically significant or negative, but after the reform, the product quality of firms in the experimental group was significantly positive. Preliminary evidence suggests that the reform is highly likely to improve the quality of firms' export products.

## 4. Empirical results

### 4.1. Baseline results

The results in [Table 3](#) demonstrate that transforming counties into districts significantly enhances the quality of firms' export products, irrespective of whether control variables are considered, thereby providing preliminary confirmation of [Hypothesis 1](#). However, this positive and significant results might stem from the self-selection issues. Specifically, the prefecture-level cities where this reform was enacted are typically provincial capitals or other large cities with robust economic performance. Consequently, the counties within these cities are more likely to satisfy the criteria for transformation into districts, wherein firms tend to exhibit higher product quality compared to those

in other cities. Therefore, we employ three methods to address the endogeneity issues.

Firstly, we utilize whether the prefecture-level city where a certain county is located has undergone a county-to-district reform in the past year as an instrumental variable for the Policy). On the one hand, this instrumental variable is highly correlated with the policy variable; once a city undergoes the reform, the likelihood of subsequent reforms tends to increase, reflecting the prefecture government's inclination and capacity to push for the reform. On the other hand, this instrumental variable, being lagged, may be unrelated to the current random disturbance. Moreover, if the prefecture-level city to which county A is subordinate has undergone a county-to-district reform in the previous period (e.g., in county B), it is generally assumed that whether or not county B is reformed is not directly related to the quality of the products exported by firms in county A. This satisfies the exclusion restriction assumption required by the instrumental variable. The estimated results are presented in the first and second columns of [Table 4](#). In the first stage, the instrumental variable is highly correlated with the policy variable, and the F-value exceeds 10, indicating that there is no weak instrument issue. In the second stage, the reform, as estimated using the instrumental variable, still significantly promote the quality of firms' export products.

The second approach is to remove prefecture-level cities that have not implemented the county-to-district reform at all during the study period in order to exclude the effect of large differences between reformed and unreformed cities on the results, and thus to compare the differences in firm product quality between reformed and unreformed counties within the cities that have implemented the reform. The results are shown in column (3) of [Table 4](#). The reform significantly improves the quality of firms' export products, regardless of whether or not control variables are introduced. These results suggest that the previous speculation about the endogeneity issue does not hold. Therefore, further analysis will be carried out using the benchmark regression estimation method in the subsequent sections.

Thirdly, there are certain conditions and thresholds for approving the application for transforming a county to a district, and reformed counties usually have better development bases before the reform. It may lead to an overestimation of the coefficients if the control group includes all other counties that have not been reformed. Therefore, this paper narrows the control group by taking the counties that were not reformed within the study period (2000–2013) but were reformed in the subsequent period (2014–2021) as the control group, in order to reduce potential biases arising from the selection effect. The regression results are shown in column (4) of [Table 4](#), and it indicates that the reform enhances the quality of firms' export products, which ensures the robustness of the benchmark results.

In addition, in order to ensure a smooth upgrade to a municipal district, local governments will optimize the local industrial layout in advance. This will also affect the quality of firms' export products in the future. Therefore, we use counties that have submitted applications but were rejected by the central government as a control group to conduct a robustness test. The results in column (5) of [Table 4](#) demonstrate that the coefficient remains positive and is larger than the baseline results (0.57). Although the *p*-value is not significant, the relatively small *p*-value indicates that the results are robust to some extent.

### 4.2. Some tests

#### 4.2.1. Parallel trends test

It is generally believed that the policy effects generated by the implementation of the county-to-district reform exhibit certain lagging characteristics. Therefore, using three years ahead as the current period, a parallel trends test is conducted with reference to [Beck et al. \(2010\)](#), comparing the situation in the four years prior to the reform and the five years after the reform, and the results are shown in [Fig. 2](#). It can be seen that before the reform, there was no significant difference between the

**Table 1**  
The descriptive statistics of variables.

| Variables                       | Symbol        | Sample size | Mean    | Standard deviation | Minimum value | Maximum value |
|---------------------------------|---------------|-------------|---------|--------------------|---------------|---------------|
| Firm's Export Product Quality   | quality       | 277,608     | 0.6476  | 0.1469             | 0             | 1             |
| County-to-District Reform       | policy        | 445,233     | 0.1686  | 0.3744             | 0             | 1             |
| Firm's Tax Burden               | tax           | 299,169     | 0.1359  | 0.1735             | -0.2432       | 0.9007        |
| Firm's Capital Liquidity        | liquidity     | 367,585     | 0.0949  | 0.2910             | -0.7186       | 0.7938        |
| Firm agglomeration              | agglomeration | 412,286     | 3.7764  | 3.2232             | 0             | 10.6771       |
| Firm innovation                 | innovation    | 411,962     | 0.2567  | 1.19424326         | 0             | 9             |
| Transaction Costs for Firms     | cost          | 371,049     | 0.0591  | 0.0531             | 0.0013        | 0.2917        |
| Firm's Age                      | age           | 411,769     | 9.0988  | 6.6416             | 0             | 41            |
| Firm's Size                     | size          | 411,412     | 10.7004 | 1.4996             | 0             | 20.1601       |
| Firm's Asset-Liability Ratio    | AIR           | 371,748     | 0.5486  | 0.2622             | 0.0210        | 1.2257        |
| Firm's Operating Profit Margin  | profit        | 319,900     | 0.0404  | 0.0805             | -0.2979       | 0.2958        |
| Firm's Leverage Ratio           | lever         | 370,949     | 3.3385  | 5.0981             | -13.1243      | 34.7556       |
| Government Subsidy Firms obtain | subsidy       | 445,233     | 0.4955  | 0.5000             | 0             | 1             |

**Table 2**  
Statistics of export product quality in the treatment and control groups.

| Policy year | Pre-reform/post-reform | Treatment | Control | Diff       |
|-------------|------------------------|-----------|---------|------------|
| 2001        | Pre-reform             | 0.6576    | 0.6630  | -0.0053    |
|             | Post-reform            | 0.6813    | 0.6634  | 0.0179***  |
| 2002        | Pre-reform             | 0.6664    | 0.6988  | -0.0324    |
|             | Post-reform            | 0.6778    | 0.6632  | 0.0145***  |
| 2003        | Pre-reform             | 0.6827    | 0.6610  | 0.0217**   |
|             | Post-reform            | 0.6718    | 0.6572  | 0.0147***  |
| 2011        | Pre-reform             | 0.6027    | 0.6476  | -0.0450*** |
|             | Post-reform            | 0.6616    | 0.6570  | 0.0046**   |
| 2012        | Pre-reform             | 0.6544    | 0.6580  | -0.0036    |
|             | Post-reform            | 0.6564    | 0.6513  | 0.0052***  |
| 2013        | Pre-reform             | 0.6475    | 0.6551  | -0.0076    |
|             | Post-reform            | 0.6530    | 0.6500  | 0.0030*    |

Note: \*, \*\*, and \*\*\* indicate that the difference between the treatment group and the control group is statistically significant at the 0.1, 0.05, and 0.01 levels, respectively, in the t-test.

**Table 3**  
The effect of the county-to-district reform on the quality of firms' export products.

|                              | Firm product quality | Firm product quality |
|------------------------------|----------------------|----------------------|
| Policy                       | 0.0045* (0.0027)     | 0.0057** (0.0028)    |
| Firm age                     |                      | -0.0001 (0.0001)     |
| Firm size                    |                      | 0.0371*** (0.0010)   |
| Firm asset-liability ratio   |                      | 0.0076*** (0.0025)   |
| Firm operating profit margin |                      | 0.0067*** (0.0021)   |
| Firm leverage ratio          |                      | 0.0001 (0.0001)      |
| Government subsidies         |                      | 0.0099*** (0.0012)   |
| Time fixed effects           | Controlled           | Controlled           |
| Firm fixed effects           | Controlled           | Controlled           |
| Constant                     | -0.4972*** (0.0030)  | -0.8657*** (0.0104)  |
| Observations                 | 277,569              | 224,030              |
| R <sup>2</sup>               | 0.0045               | 0.0153               |

Note: Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

treatment and the control group. However, after the reform, there is an overall ascending trend in the difference, satisfying the parallel trends test.

**4.2.2. Placebo test**

Adhering to methods utilized by Li et al. (2016), we executed a placebo test via 1000 iterations of random sampling to derive the kernel density distribution of the estimated coefficient, assessing the impact of the county-to-district reform on the quality of a firm's export products, as depicted in Fig. 3. The kernel probability density predominantly demonstrates a normal distribution, indicating that the placebo test did not yield significant treatment effects. This underscores that the empirical results of this study are not attributable to random factors, thereby bolstering the above conclusion that the county-to-district

reform has exerted a positive influence on the enhancement of firms' product quality.

**4.2.3. Treatment effect heterogeneity in staggered DID**

To obtain an unbiased estimate of the Average Treatment Effect (ATE), in addition to satisfying the parallel trends assumption, the TWFE estimator must also meet the condition that "treatment effects are constant across groups and time periods." Additionally, the staggered DID estimation method based on Two-Way Fixed Effects (TWFE) may encounter issues with negative weights arising from heterogeneous treatment effects, which can lead to estimation bias (Baker et al., 2022; Goodman-Bacon, 2021).

This study follows Xue et al. (2023) and applies two methods to address this issue, converting the unbalanced panel data into balanced panel data. The first method utilizes Callaway and Sant'Anna (2021)'s approach to handle treatment effect heterogeneity.<sup>1</sup> Specifically, this study calculates group-time average treatment effects, using never-treated and not-yet-treated groups as control groups. As shown in Table 5, the estimated coefficients remain significant and positive, thus ensuring the robustness of the baseline regression.

The second method employs Gardner's two-stage regression approach.<sup>2</sup> To further mitigate potential biases in TWFE estimates, this study conducts robustness checks following Gardner (2022)' methodology. As indicated in Table 5, the results demonstrate that the county-to-district reform significantly and positively impacts the quality of firms' export products at the 5 % significance level. This finding indicates that the baseline regression results are robust, even when accounting for potential biases in TWFE estimates.

**4.2.4. Robustness tests**

During the research period of this paper, spanning from 2000 to 2013, a number of events and policies may have influenced the quality of firms' export products. Consequently, it is necessary to control for any potential interference with the baseline results. Firstly, China's accession to the WTO in 2001 was conducive to expanding firms' export scale and enhancing their product quality. To address this, we delete the samples in 2001. The results presented in the column (1) of Table 6 indicate that the positive impact of the county-to-district reform on the quality of firms' export products is statistically significant.

Secondly, the implementation of large-scale decentralization reforms since the 21st century has had a pronounced effect on the operation of firms in the jurisdiction. This is due to the adjustment of the relevant county government's administrative and financial authority resulting from the administrative decentralization reform—the devolution of more power to counties—and the fiscal decentralization reform—province-managing-county fiscal reform and flattening of the government

<sup>1</sup> Stata command: csdid.

<sup>2</sup> Stata command: did2s.

**Table 4**  
The results after addressing endogeneity.

|                         | Instrumental variable method |                           | Excluding non-reformed prefecture cities | Control group: non-reformed counties (2014–2021) | Control group: non-reformed counties that have submitted applications |
|-------------------------|------------------------------|---------------------------|--|--|---|
|                         | (1) First Stage: Policy      | (2) Second Stage: Quality | (3) Quality                              | (4) Quality                                      | (5) Quality   |
| Instrumental variable   | 0.9348***<br>(0.0010)        |                           |  |  |   |
| Policy                  |                              | 0.0134*** (0.0016)        | 0.0066** (0.0029)                        | 0.0306*** (0.0081)                               | 0.0125 (0.0109)   |
| Control variables       | Controlled                   | Controlled                | Controlled                               | Controlled                                       | Controlled  |
| Time fixed effects      | Controlled                   | Controlled                | Controlled                               | Controlled                                       | Controlled  |
| Firm fixed effects      | Controlled                   | Controlled                | Controlled                               | Controlled                                       | Controlled  |
| Constant                | 0.0140***<br>(0.0035)        | -0.5932***<br>(0.0057)    | -0.8980*** (0.0135)                      | -0.9500*** (0.0250)                              |   |
| Observations            | 196,503                      | 145,793                   | 138,642                                  | 50,825   | 59,292  |
| First stage F-statistic | 99,999                       |                           |  |  |   |
| R <sup>2</sup>          | 0.8295                       | 0.0057                    | 0.0150                                   | 0.0182   | 0.018   |

Note: Standard errors in parentheses. \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

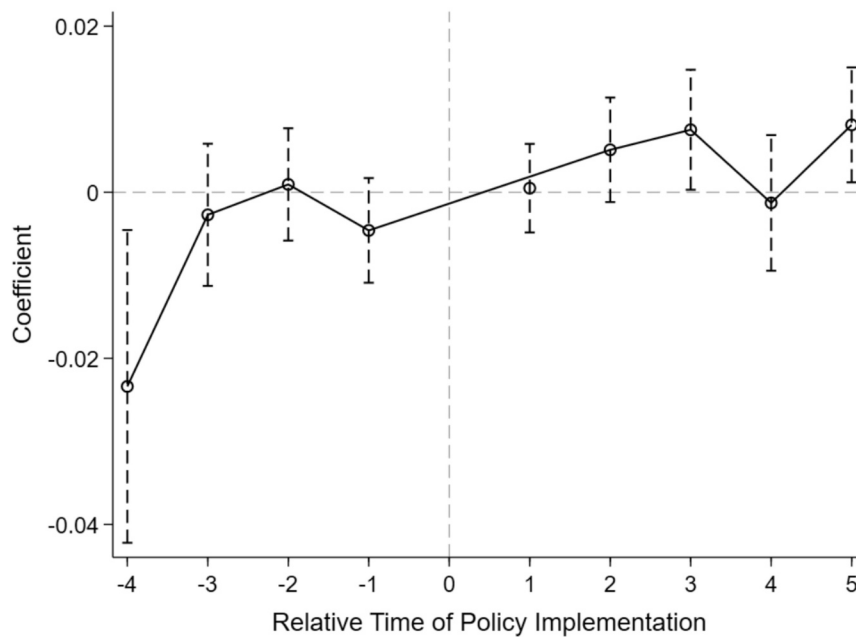


Fig. 2. Parallel trends test.

hierarchy. This paper obtains the column (2) of Table 6 by deleting the counties that implemented the two decentralization reforms. The results indicate that the county-to-district reform continues to enhance the quality of firms' export products. This suggests that the baseline results are not affected by other county reforms in the same period.

Thirdly, considering the export tax rebate policy adjustment implemented in 2008 and the package introduced in 2009 to cope with the global financial crisis, this paper deletes the 2008 and 2009 samples to obtain the column (3) of Table 6. The findings indicate that the county-to-district reform can still significantly improve the quality of firms' export products. All the above results demonstrate that the positive impact observed in the baseline model remains highly robust when excluding the interference of other policies and events in the same period.

### 4.3. Mechanism analysis

This section further investigates the underlying mechanisms through which the county-to-district reform improve the quality of firms'

exporting products.

#### 4.3.1. Financial constraints and product mix adjustment

As shown in the first column of Table 7, the coefficient of the policy variable is significantly positive, suggesting that reform significantly increases the tax burden on firms. This indicates that after counties are incorporated into the prefecture, the original county government's capability and willingness to support firms in terms of taxation indeed declines, which may increase firms' financial constraints. The results in the second column further confirm that the capital liquidity of firms indeed significantly decreases following the reform in the county where the firm is situated. This suggests that changes in government functions and fiscal systems lead to a reduction in tax incentives for firms, which in turn increases their financial constraints. The results of the third column show that the reform significantly improves the proportion of high-quality products in export firms, confirming that increased financial constraints compel firms to adjust their product mix. Specifically, firms are prompted to abandon low-end marketing strategies in favor of focusing more on high-quality products. This verifies the Hypothesis 2a.

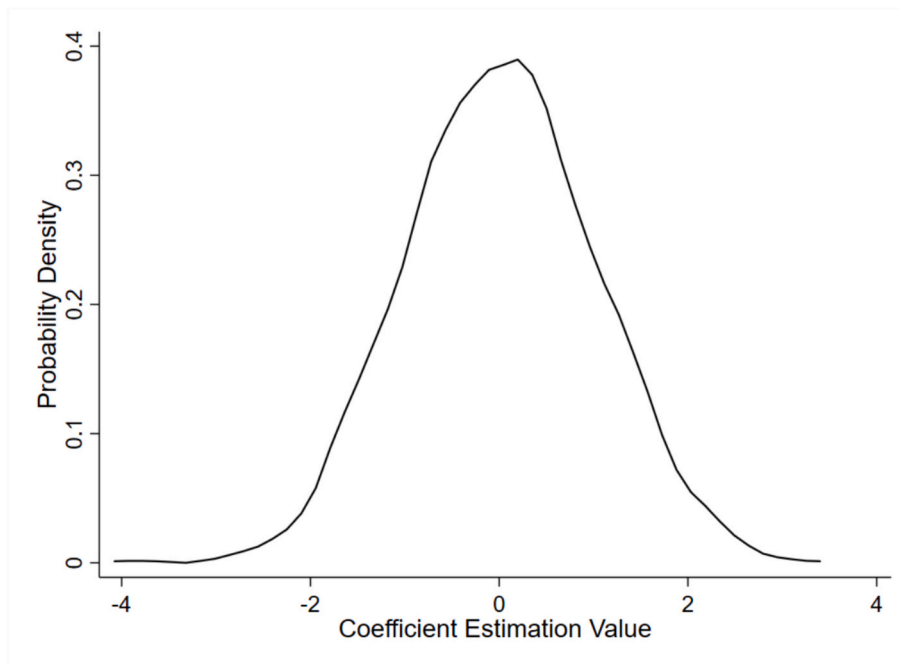


Fig. 3. Kernel probability density.

**Table 5**  
Regression results of heterogeneous treatment effects in staggered DID.

|                               | Coefficient | Standard error | Z-value | P-value | 95 % confidence interval |        |
|-------------------------------|-------------|----------------|---------|---------|--------------------------|--------|
| Callaway and Sant'Anna (2021) | 0.2321***   | 0.0588         | 3.94    | 0.0000  | 0.1167                   | 0.3474 |
| Gardner (2022)                | 0.1940**    | 0.0987         | 1.97    | 0.049   | 0.0006                   | 0.3874 |

**Table 6**  
Robustness tests - excluding other policies and events in the same period.

|                    | (1)<br>Exclude the 2001 samples | (2)<br>Exclude the counties implementing other decentralization reforms | (3)<br>Exclude the 2008 and 2009 samples |
|--------------------|---------------------------------|---|--|
| Policy             | 0.0064** (0.0030)               | 0.0056* (0.0030)  | 0.0055* (0.0030)                         |
| Control variables  | Controlled                      | Controlled  | Controlled                               |
| Time fixed effects | Controlled                      | Controlled  | Controlled                               |
| Firm fixed effects | Controlled                      | Controlled  | Controlled                               |
| Constant           | -0.8682*** (0.0106)             | -0.8734*** (0.0114)   | -0.8773*** (0.0111)                      |
| Observations       | 216,443                         | 180,781   | 203,226                                  |
| R <sup>2</sup>     | 0.0153                          | 0.0189  | 0.0164                                   |

This indicates that, in order to survive in market competition, firms are driven to intensify their efforts in enhancing product quality, aligning it more closely with their core competencies. Consequently, this leads to a strategic reallocation of resources towards higher-quality products, as evidenced in the findings of Meng et al. (2020).

4.3.2. Agglomeration and innovation

The results from the fourth column of Table 7 indicate that the implementation of the county-to-district reform significantly increases

the exporting firms' agglomeration level in the reformed counties. Specifically, the county-to-district reform breaks down the administrative barriers between the county and urban districts within their affiliated prefecture-level city, enhancing the degree of market integration and allowing factors of production and goods to flow more freely. More firms enter the reformed counties, not only bringing more information, technology and knowledge, but also stimulate fiercer market competition. Market competition improves the business environment, compelling firms to shift their resources towards innovation (Fan et al., 2023). Both knowledge spillovers and fiercer competition can compel firms to enhance their competitiveness through innovation, so we verify this conjecture by estimating the effect of the reform on firms' innovation. The result in the fifth column of Table 7 shows that the coefficient is significantly positive, demonstrating that the county-to-district reform encourages firms to engage in R&D and innovation activities. This confirms Hypothesis 3 and aligns with the findings of Meng et al. (2020) and Sui et al. (2022). The innovation effects of agglomeration and the quality improvement effects of innovation have been widely proven in existing studies, and this paper does not aim to prove them again.

4.3.3. Administrative efficiency and transaction costs

Considering that China's customs supervision services are provided at the municipal level, the county-to-district reform shortens the distance between firms and export service management departments, thereby optimizing the convenience of export services available to firms. Therefore, this paper measures firms' transaction costs using the ratio of management expenses to main business product sales revenue. As shown in Table 7, the county-to-district reform reduces firms' transaction costs. This indicates that the administrative efficiency improvements brought about by the reform reduce the time and labor costs associated with cumbersome administrative procedures, allowing firms to focus more on production and innovation itself. Many studies agree that increased administrative efficiency of local governments and lower transaction costs for firms contribute to improved product quality. This is because the funds saved can be reinvested in research and development, equipment upgrades, and quality control (Acemoglu et al., 2007). Furthermore, reduced waiting times for approvals minimise resource waste and opportunity costs, enabling firms to focus more on enhancing product quality.

**Table 7**  
The mechanisms behind the influence of the reform.

|                    | Financial constraint and product mix adjustment |                        |   | Agglomeration and Innovation |                         | Administrative efficiency       |
|--------------------|---|------------------------|---|------------------------------|-------------------------|---------------------------------|
|                    | (1) Tax Burden                                  | (2) Capital Liquidity  | (3) Proportion of high-quality products | (4) Agglomeration            | (5) Innovation          | (6) Transaction Costs for firms |
| Policy             | 0.0105***<br>(0.0041)                           | -0.0061***<br>(0.0021) | 0.0053* (0.0031)                        | 0.4610***<br>(0.0071)        | 0.0853** (0.0406)       | -0.0045*** (0.0009)             |
| Control variables  | Controlled                                      | Controlled             | Controlled                              | Controlled                   | Controlled              | Controlled                      |
| Time fixed effects | Controlled                                      | Controlled             | Controlled                              | Controlled                   | Controlled              | Controlled                      |
| Firm fixed effects | Controlled                                      | Controlled             | Controlled                              | Controlled                   | Controlled              | Controlled                      |
| Constant           | 0.1007 (0.0148)                                 | 0.5453*** (0.0076)     | 0.7043*** (0.0109)                      | 1.0511***<br>(0.0248)        | -18.8142***<br>(0.1454) | 0.0269*** (0.0033)              |
| Observations       | 298,346   | 315,563                | 236,393                                 | 294,024                      | 315,563                 | 318,761                         |
| R <sup>2</sup>     | 0.0026  | 0.3696                 | 0.0074                                  | 0.3214                       | 0.0474                  | 0.8703                          |

Note: Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

4.4. Heterogeneity analysis

This section further examines the heterogeneous effect of the county-to-district reform across different firms' ownership, efficiency and locations.

4.4.1. Firm ownership

State-owned enterprises (SOEs), as entities owned by the government, have to undertake some governmental functions, such as safeguarding employment and maintaining social stability, even can exchange their leaders with governmental departments (Bai et al., 2004). This political connection grants SOEs preferential local policies and financial protection, leading to significant differences in their financing constraints, operational strategies, and objectives compared to private-owned or foreign-owned enterprises. This political connection may prompt firms to engage in unproductive activities, like seeking to please the government and pursuing privileges, which can potentially create a crowding-out effect, sidelining regular business activities such as technological R&D. Given that resources at the disposal of county-level governments are finite, they may preferentially support firms with closer ties, which could constrict the developmental opportunities available to firms with weaker governmental connections.

To prove whether the impact of the county-to-district reform on the quality of firms' products varies across state-owned and non-state-owned enterprises, this study categorizes the samples into two groups: SOEs and non-SOEs. An enterprise is classified as a SOE if state capital is the dominant component in its paid-in capital, meaning it surpasses other types of capital such as collective, corporate, individual, and capital originating from Hong Kong, Macao, Taiwan, and foreign countries. Enterprises not meeting this criterion are categorized as non-SOEs. The results from columns 1–2 of Table 8 reveal that the reform increases the quality of the export products of non-SOEs, while it has the opposite effect on SOEs. This suggests that SOEs, to a certain extent, are more reliant on support from county-level governments. The reduction

in policy support from external governments following the reforms, combined with a lack of internal innovation, appears to lower their product quality. In contrast, non-SOEs, despite potentially facing increased competition after the reform, are likely to benefit from a fairer business environment. In this scenario, non-SOEs are compelled to take proactive measures in adapting to the new conditions, such as sharing more budget for R&D activities, which contributes significantly to enhanced productivity, often leading to an overall improvement in their product quality (Tao et al., 2023).

4.4.2. Firms' efficiency

High-efficiency firms, characterized by strong operational capabilities and resilience, can quickly adjust to new business environments. In contrast, low-efficiency firms often face greater financial constraints during significant market shifts and are more susceptible to being phased out by the market. To examine whether the impact of the reform varies based on firms' efficiency, we divide the samples into two groups: high-efficiency firms and low-efficiency firms. We measure a firm's efficiency by its labor productivity, calculated as the main business revenue divided by the total number of employees. Firms are then categorized into these two groups based on the average value of this metric.

Columns (3) and (4) of Table 8 show that the county-to-district reform tends to improve the export product quality of high-efficiency firms, while it has a negative impact on low-efficiency firms. This suggests that high-efficiency firms are more adaptable to the competitive market environment post-reform. They effectively use their business strengths to intensify research and development (R&D) and innovation efforts. These efforts, in turn, have been proven to significantly enhance firms' product quality. For low-efficiency enterprises, changes in the government environment pose a significant challenge. On one hand, the increased competition due to more enterprises entering the market often puts them at a disadvantage. On the other hand, in a fairer business environment, the opportunities to secure orders through informal

**Table 8**  
Results based on firm heterogeneity.

|                    | Firm ownership      |                     | Firm's efficiency         |                          | Regional marketization level |                     |
|--------------------|---------------------|---------------------|---------------------------|--------------------------|------------------------------|---------------------|
|                    | (1) SOEs            | (2) Non-SOEs        | (3) High-efficiency firms | (4) Low-efficiency firms | (5) High                     | (6) Low             |
| Policy             | -0.0012 (0.0111)    | 0.0061** (0.0030)   | 0.0165*** (0.0047)        | -0.0036 (0.0040)         | 0.0048* (0.0028)             | 0.0586** (0.0253)   |
| Control variables  | Controlled          | Controlled          | Controlled                | Controlled               | Controlled                   | Controlled          |
| Time fixed effects | Controlled          | Controlled          | Controlled                | Controlled               | Controlled                   | Controlled          |
| Firm fixed effects | Controlled          | Controlled          | Controlled                | Controlled               | Controlled                   | Controlled          |
| Constant           | -0.8467*** (0.0880) | -0.8740*** (0.0111) | -0.8028*** (0.0221)       | -0.8619*** (0.0151)      | -0.8745*** (0.0107)          | -0.7475*** (0.0457) |
| Observations       | 23,609              | 200,421             | 107,618                   | 116,412                  | 211,346                      | 12,684              |
| R <sup>2</sup>     | 0.0156              | 0.0165              | 0.0087                    | 0.0164                   | 0.0160                       | 0.0102              |

Note: Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

channels like bribery or political connections are reduced (Vendrell-Herrero et al., 2022).

#### 4.4.3. Regional marketization level

The impact of the county-to-district reform may vary across regional marketization level. The administrative barriers between counties and urban districts are not uniformly high across all regions. In the region with lower barriers, even after implementing the county-to-district reform, there may not be a significant improvement in market integration and the efficiency of the flow of production factors. Consequently, the product quality of firms in the region may not show a significant enhancement. In contrast, in the region with higher barriers, the reform can significantly increase the level of market integration, resulting in a substantial improvement in the quality of firms' products.

This paper employs the Fan and Wang's Marketization Index as a proxy for regional marketization level (Fan et al., 2003). The index is currently an important indicator for measuring the degree of marketization at the provincial level in China and is widely used in empirical studies (Chen et al., 2015; Gao & Hafsi, 2015). The regions are classified as either high or low marketization based on whether they exceed the median value of the Marketization Index in 2006–2007, which represents the midpoint of the study period. The regions with a high level of marketization are characterized by a more market-oriented approach, featuring less government intervention in the market economy, greater market integration, fiercer competition, and a better business environment. They include Beijing, Tianjin, Liaoning, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, and Sichuan. In contrast, other provinces are classified as the low-marketization regions.

The results in columns (5) and (6) of Table 8 reveal that whether it is a high marketization level region or a low marketization level region, the reform significantly improves the quality of export products of firms. Then, this paper conducts *t*-test on the coefficient difference caused by the high and low levels of marketization, and gets is statistically significant. This indicates that relative to the high marketization regions, the effect of county-to-district reform is more obvious in low marketization regions. This could suggest that the low marketization regions, characterized by more larger administrative barriers and lower market integration compared to the high marketization regions, experiences notable improvements in market integration and business environment after the reform, thereby significantly enhancing the product quality of firms in the regions.

## 5. Conclusion and discussion

This paper examines the impact of removing the administrative barriers on the quality of firms' export products by using China's county-to-district reform as a quasi-natural experiment. During the stage when China is transitioning into a high-quality development, economic decentralization and political centralization have brought about the high administrative barriers. This has led to the inefficiency of resource allocation, and ultimately impeding its high-quality development, even though decentralization was once considered an important institutional underpinning of China's economic growth miracle during the fast growth stage. The county-to-district reform serves as an excellent quasi-natural experiment for identifying administrative barriers, because it eliminates administrative barriers between urban districts and counties within the same prefecture-level city, which promotes market integration and lowers the cost of the flow of factors and products.

We built a panel dataset from 2000 to 2013 by combining datasets from Chinese industrial enterprises, customs, patents and counties affected by the county-to-district reform. Our findings, based on econometric analysis, confirm the hypothesis that the county-to-district reform can significantly improve the quality of export products of firms within its jurisdiction, indicating that removing administrative barriers enhances the quality of the economy. Further, the reform influences firms' product quality primarily through two channels. Firstly, the reform diminishes local protectionism and amplifies financial pressures on firms due to the tightening of preferential policies. This compels firms to focus more on exporting competitive, high-quality products. Secondly, the reform eliminates barriers between urban districts and counties, promoting firm clustering within the reformed counties. This encourages innovation through knowledge spillovers and heightened competition, ultimately improving the quality of export products. Third, the reform improves the administrative efficiency of local governments in handling firms' export activities and reduces transaction costs for firms, which allows firms to allocate more funds and time to improving the quality of their export products. The impact of the reform is notably pronounced in specific types of firms: non-state-owned enterprises, high-efficiency enterprises, and those located in the less marketized regions, demonstrating a variance in the reform's effect based on firm heterogeneity.

As the negative impacts of local protectionism and inter-regional barriers have increasingly been recognized, the State Council of China in 2022 issued the document "Opinions on Accelerating the Construction of a Large National Unified Market," highlighting the necessity for a unified domestic market. Although the county-to-district reform has only achieved market integration within a relatively small spatial scope (i.e. the prefecture-level city), it has led to significant product upgrading. Consequently, dismantling administrative barriers both between prefectures and between provinces holds significant importance for enhancing the overall economic quality of China. Furthermore, developing a system that can both eliminate administrative barriers and maintain the local governments' motivation for economic development is a crucial topic worthy of exploration.

### CRedit authorship contribution statement

**Qi Guo:** Visualization, Investigation, Data curation, Writing – original draft. **Jun Liu:** Data curation, Writing – original draft, Visualization, Investigation. **Shengjun Zhu:** Supervision, Methodology, Conceptualization, Validation, Writing – review & editing. **Canfei He:** Methodology, Conceptualization, Validation, Supervision, Writing – review & editing. **Yi Han:** Writing – review & editing.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A

Table A1

The variable definition.

| Variables                             | Measurement method   |
|---------------------------------------|--|
| Policy                                | Policy <sub>it</sub> is a dummy variable used to represent the implementation of the county-to-district reform. If the county in which a firm is located is listed for this reform in year t, the variable is assigned a value of 1 for year t and all subsequent years; otherwise, it is assigned a value of 0. Specifically, Policy <sub>it</sub> is obtained from the interaction of Treat <sub>it</sub> and Post <sub>it</sub> , where Treat <sub>it</sub> represents whether reform has occurred, and Post <sub>it</sub> represents when the reform occurs. |
| The quality of firm's export products | Based on the post hoc reasoning method, as shown in eqs. (2) to (4) in the paper.  |
| Firm age                              | Be calculated as the current year minus the year of establishment.   |
| Firm size                             | Be represented by the logarithm of the firm's total assets.  |
| Firm asset-liability ratio            | Be measured by the ratio of the firm's total liabilities to its total assets.  |
| Firm operating profit margin          | Be measured by the proportion of the firm's operating profit to its main business sales revenue.   |
| Firm leverage ratio                   | Be measured by the ratio of the firm's total assets to the sum of owner's equity.  |
| Government subsidy                    | Be a dummy variable. If a firm has subsidy income, assign a value of 1; otherwise, assign a value of 0.  |
| The tax burden                        | Be measured by the proportion of income tax payable to operating profit.   |
| Firm capital liquidity                | Be calculated as the difference between total current assets and total current liabilities, divided by total assets.   |
| Product mix adjustment                | The proportion of high-quality products in exporting firms. The average quality of the same export product over the study period is defined as high-quality products, and the proportion of exports of such products to the total export value of all products of the firm in the current year is summed to obtain the proportion of high-quality products exported by the firm in the current year.   |
| Firm agglomeration                    | Apply the logarithmic transformation to the number of exporting firms in the same industry and county.   |
| Innovation                            | Apply the logarithmic transformation to the number of invention-type patents.  |
| Transaction costs for firms           | The ratio of a firm's administrative expenses to its revenue from the sales of its main business products.   |

## Data availability

The data that has been used is confidential.

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