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Currency Appreciation, Product Reallocation, and Exporter Productivity

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Abstract

We examine how exchange-rate movements affect the productivity of exporting firms. Exploiting Chinas 2005 exchange rate regime reform as a quasi-natural experiment, we find that the resulting currency appreciation significantly increases exporters total factor productivity. We show that this effect arises from within-firm resource reallocation across products. Facing higher marginal costs in foreign currency, exporters shift resources toward better-performing products, which improves the composition of production and raises measured total factor productivity. Our findings highlight product reallocation as an important channel through which exchange-rate movements affect firm productivity.

Keywords: Currency Appreciation; Total Factor Productivity; Resource Reallocation

JEL Codes: F14, F31

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1 Introduction

How do exporters respond to exchange-rate movements, and what are the consequences for firm productivity? A large literature has documented how exchange rates affect exporters' prices and quantities. For example, Berman, Martin and Mayer (2012) show substantial heterogeneity in exporters' responses to currency depreciation in both prices and quantities, while Li, Ma and Xu (2015) find relatively high exchange-rate pass-through and a moderate quantity response using Chinese firm-level data. Much less is known about how exchange-rate movements affect productivity within exporting firms. Currency appreciation may reduce exporters' competitiveness by increasing the domestic-currency cost of serving foreign markets. At the same time, the resulting cost pressure may induce firms to adjust the allocation of resources across products, potentially shifting production toward their more productive products. This paper studies this productivity channel of exchange-rate adjustment.

We examine the effect of currency appreciation on exporters' total factor productivity using firm- and product-level data for Chinese manufacturing firms from 2002 to 2007. We exploit China's 2005 exchange-rate regime reform as a quasi-natural experiment and compare exporters with non-exporters in a difference-in-differences framework. The reform replaced the previous fixed exchange-rate regime with a managed floating regime and was followed by a substantial appreciation of the renminbi. We find that exporters experienced a significant increase in measured TFP relative to non-exporters after the reform. The effect is stronger for firms with greater export shares, consistent with greater exposure to the exchange-rate-induced cost pressure.

We then examine the mechanism behind this productivity effect. Using product-level information within firms, we find that exporters respond to currency appreciation by reallocating resources toward better-performing products. In other words, the productivity gain does not arise simply because firms become more productive within individual products. Instead, exchange-rate-induced cost pressure changes the composition of production within the firm, shifting resources toward products with higher productivity. This within-firm product reallo-

cation generates an increase in measured firm-level TFP. The effect is also heterogeneous across firms and industries. The productivity response is stronger in industries with lower TFP dispersion and among firms with lower import shares and smaller market shares, suggesting that the extent of product-level adjustment depends on firms' production and market environments.

To clarify this mechanism, we develop an open-economy model following Mayer, Melitz and Ottaviano (2020). The model emphasizes the cost implications of exchange-rate appreciation for multi-product exporters. When export revenues are denominated in foreign currency while a substantial share of production costs is incurred in the home currency, home-currency appreciation raises exporters' marginal costs in destination-currency terms. Rather than treating appreciation simply as an increase in competitive pressure, the model shows that this cost shock changes the relative profitability of products within a firm. Under Marshall's Second Law of Demand (MSLD), the firm reallocates sales and production toward better-performing products. This product-mix adjustment raises measured firm-level productivity even without an improvement in the underlying productivity of individual products.

Our paper contributes to three strands of literature. First, it relates to the literature on trade and productivity. Trade exposure can improve productivity through selection and reallocation across firms, as less productive firms exit and resources move toward more productive firms (Melitz, 2003). Trade liberalization has also been shown to increase productivity through greater foreign competition (Pavcnik, 2002). For Chinese manufacturing firms, Hu and Liu (2014) find substantial productivity gains following trade liberalization. Other studies have documented productivity responses to exchange-rate movements through changes in shipments and production decisions (Fung, 2008; Fung, Baggs and Beaulieu, 2011). Related work also emphasizes that measured productivity can reflect changes in prices, demand, and product composition rather than changes in underlying production efficiency (Feenstra, 1989; De Loecker, 2011). We contribute to this literature by identifying a within-firm product-reallocation channel through which exchange-rate appreciation affects measured productivity.

Second, our paper relates to the literature on resource allocation and productivity. Misallocation of resources across firms and production units has been identified as an important source

of productivity differences across countries and industries (Hsieh and Klenow, 2008; Bartelsman, Haltiwanger and Scarpetta, 2009). Financial frictions and policy distortions can generate inefficient allocation of capital and other resources, thereby reducing aggregate productivity (Dai, Maitra and Yu, 2016; Gopinath et al., 2017; Guner, Ventura and Yi, 2008; Rogerson and Restuccia, 2004). While this literature typically studies distortions in the allocation of resources across firms, we focus on resource allocation across products within firms. Our evidence shows that an external price shock, rather than a direct policy intervention aimed at resource allocation, can induce firms to adjust their product mix in a way that raises measured productivity.

Third, we contribute to the literature on the effects of exchange-rate movements on firm behavior. Previous studies have examined how exchange rates affect firm entry and exit, extensive and intensive margins, prices, markups, and employment (Baldwin and Krugman, 1989; Baggs, Beaulieu and Fung, 2009; Tang and Zhang, 2012; Chatterjee, Dix-Carneiro and Vichyanond, 2013; Martín and Rodríguez, 2004; Hellerstein, 2008). Most closely related to our paper, Ekholm, Moxnes and Ulltveit-Moe (2012) show that Norwegian exporters responded to a sharp currency appreciation by reducing employment and increasing labor productivity. We complement this evidence by focusing on product-level resource allocation within multi-product firms. More importantly, the 2005 Chinese exchange-rate reform provides a quasi-experimental setting that allows us to identify the causal effect of currency appreciation on exporter productivity.

The 2005 exchange-rate reform provides a useful setting for studying this question because it generated a common exchange-rate shock while firms differed substantially in their exposure to foreign markets. Our results show that the productivity consequences of exchange-rate appreciation extend beyond changes in export prices and quantities. Exporters adjust the composition of their production, shifting resources toward better-performing products when foreign-currency cost pressure increases. This finding highlights product reallocation as an additional channel through which exchange-rate movements can shape firm productivity.

The remainder of the paper is organized as follows. Section 2 describes China's 2005 exchange-rate regime reform. Section 3 develops an open-economy model of multi-product exporters and shows how exchange-rate-induced cost pressure leads firms to reallocate resources toward

better-performing products. Section 4 describes the data. Section 5 presents the empirical strategy and results, including the mechanism and heterogeneity analyses. Section 6 concludes.

2 Background

The Peoples Bank of China (PBOC) has been highly regulating the RMB exchange rate. The RMB exchange rate was maintained at 2.46 yuan (per USD) from 1955 for almost 16 years. By 1978, the central parity of RMB against the U.S. dollar was 1.68 yuan (per USD). After Chinas reforms and opening-up in 1978, a dual exchange rate system was instituted, followed by severe depreciation for the RMB. The RMB exchange rate depreciated from 1.56 yuan (per USD) in 1979 to 8.62 yuan (per USD) in 1994. After the Asian financial crisis in 1997, the Chinese government kept the yuan pegged strictly to the U.S. dollar, and the RMB exchange rate stayed above 8.27 yuan (per USD).

On 21 July 2005, the PBOC announced its RMB exchange rate reform. The peg to the U.S. dollar was replaced by a managed floating exchange rate system, based on the supply and demand situation of the market with reference to a basket of currencies. This reform resulted in an immediate currency appreciation of 8.11 yuan (per USD).

As Figure 1 shows, from 2002 to 2005, the RMB exchange rate against the U.S. dollar remained constant while it appreciated gradually after the exchange rate regime reform in 2005 (blue line). The nominal effective exchange rate of RMB had been decreasing since 2001 and began to appreciate after 2005 (red line).

The gradual progress of appreciation provides another important reason for us to study Chinas currency appreciation and exporter productivity. The gradual appreciation allows exporters to adjust their decisions and behaviors in response to the increasing foreign-currency cost pressure caused by the appreciation rather than being squeezed out of the market instantly.

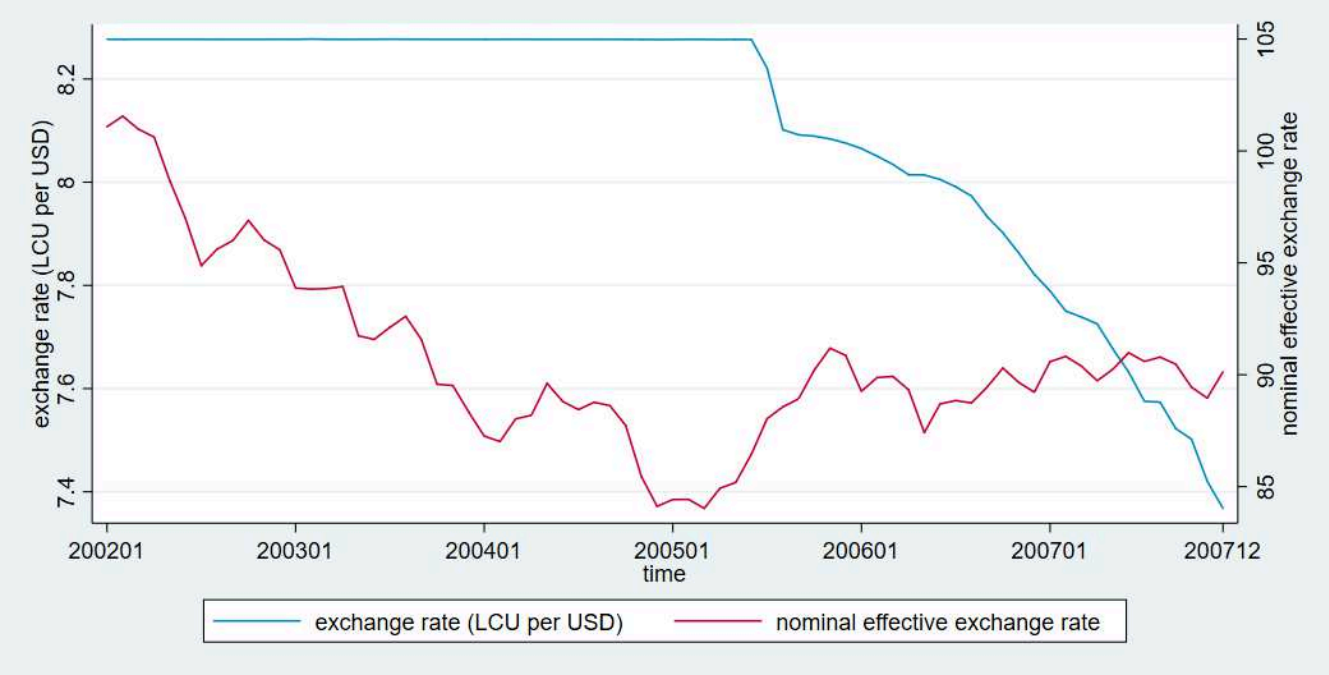


Figure 1: Exchange Rate of the RMB, 20022007.
Data Resource: https://datacatalog.worldbank.org/dataset/global-economic-monitor.

3 The Model

To better understand how the RMB exchange rate influences exporters, we develop a partial-equilibrium multi-product heterogeneous-firm model following the product-mix logic of Mayer, Melitz and Ottaviano (2020). The key departure from the previous competition-pressure formulation is that the exchange rate enters directly through exporters' foreign-currency marginal costs. Export revenues are earned in the destination currency, while a substantial part of production costs is paid in RMB. Therefore, a home-currency appreciation raises the delivered marginal cost of home exporters in foreign markets, except to the extent that imported inputs provide a natural hedge. Under variable-elasticity demand satisfying Marshall's Second Law of Demand (MSLD), this cost shock reallocates sales and output within multi-product firms toward their core, high-productivity products. The resulting change in product mix raises firm-level measured productivity even when product-level technologies are unchanged.

3.1 Demand

Consider a home country H whose firms sell differentiated products to a foreign destination market d. Consumers in destination d have additively separable preferences over a continuum of products indexed by $\omega \in \Omega_d$, and each consumer has one unit of expenditure on the differentiated sector:

$$U_d = \int_{\omega \in \Omega_d} u(q_{\omega d}) d\omega, \qquad \int_{\omega \in \Omega_d} p_{\omega d} q_{\omega d} d\omega = 1. \tag{1}$$

The sub-utility function satisfies $u(0) = 0$, $u'(q) > 0$, and $u''(q) < 0$. Let $\lambda_d > 0$ denote the marginal utility of income in destination d. The inverse residual demand curve and marginal revenue curve faced by a producer are

$$p(q) = \frac{u'(q)}{\lambda_d}, \qquad \varphi(q) = p(q) + p'(q)q = \frac{u'(q) + u''(q)q}{\lambda_d}. \tag{2}$$

We impose $\varphi'(q) < 0$ over the relevant range of outputs. Define the absolute value of the inverse demand elasticity and the absolute value of the marginal revenue elasticity as

$$\varepsilon_p(q) \equiv -\frac{p'(q)q}{p(q)}, \qquad \varepsilon_\varphi(q) \equiv -\frac{\varphi'(q)q}{\varphi(q)}, \qquad \varepsilon'_p(q) > 0, \quad \varepsilon'_\varphi(q) > 0. \tag{3}$$

The last two restrictions are MSLD and the corresponding curvature restriction on marginal revenue. These assumptions imply variable markups and incomplete pass-through. They also rule out the constant-elasticity case in which common cost shocks leave within-firm product revenue shares unchanged.

3.2 Firms, Product Ladders, and Exchange-Rate Exposure

A continuum of home firms is active in sector j. Firms are heterogeneous in a core productivity level ϕ_f. Since the empirical analysis focuses on surviving firms' post-reform adjustment, firm entry and the free-entry condition are not modeled. Firm f can produce a countable set of products indexed by $m = 0, 1, 2, \ldots$. Product $m = 0$ is the firm's core product. Products farther

from the core are less productive:

$$z_0 = 1, \qquad z_{m+1} > z_m, \qquad a_{fm} = \frac{\phi_f}{z_m}. \tag{4}$$

Thus, lower-m products are better-performing products: they have higher physical productivity and lower unit input requirements.

Let E_{dt} denote the nominal exchange rate, measured as units of home currency per unit of destination currency. A decrease in E_{dt} is a home-currency appreciation. Define the appreciation shock as

$$A_{dt} \equiv -d \ln E_{dt}. \tag{5}$$

Hence $A_{dt} > 0$ corresponds to an appreciation of the home currency against the destination currency. Production uses a composite of domestic variable inputs and imported intermediate inputs. Let $\alpha_j \in [0, 1]$ denote the imported-input share in sector j. Imported inputs are priced in foreign currency or in a foreign-currency basket that co-moves with E_{dt}. Let w_t denote the domestic composite-input cost and let B_{jt} collect sector-level input-price components other than the exchange rate. The home-currency marginal cost of producing product m and the delivered marginal cost in destination currency are

$$c^{RMB}_{fmjt} = \frac{w_t z_m}{\phi_f} B_{jt} E^{\alpha_j}_{dt}, \qquad c^{e}_{fmdt} = \frac{\tau_{jd} c^{RMB}_{fmjt}}{E_{dt}} = \tau_{jd} \frac{w_t z_m}{\phi_f} B_{jt} E^{\alpha_j - 1}_{dt}, \tag{6}$$

where $\tau_{jd} > 1$ is the iceberg trade cost. Taking logs and differentiating with respect to the appreciation shock gives

$$d \ln c^{e}_{fmdt} = (1 - \alpha_j) A_{dt}. \tag{7}$$

Equation (7) is the central exchange-rate channel. A home-currency appreciation raises exporters' foreign-currency marginal costs whenever $\alpha_j < 1$. Imported inputs provide a natural hedge: a higher α_j weakens the net cost increase generated by the appreciation. In the limiting case $\alpha_j = 1$, the foreign-currency value of imported-input costs moves one-for-one with the exchange rate, and the delivered marginal cost in destination currency is insulated from the

appreciation shock.

3.3 Product-Level Optimization

The product-level export profit of firm f from selling product m in destination d is

$$\Pi_{fmdt} = L_d[p(q_{fmdt})q_{fmdt} - c^e_{fmdt}q_{fmdt}] - f^{ex}_{jdt}, \qquad \varphi(q_{fmdt}) = c^e_{fmdt}. \tag{8}$$

The second expression is the first-order condition for an exported product. Since $\varphi'(q) < 0$, a product with lower delivered marginal cost is sold in larger quantity. Because z_m is increasing in m, the core product has the lowest delivered marginal cost and the highest equilibrium output. If the fixed export cost is paid in home currency, then $f^{ex}_{jdt} = f^x_{jt}/E_{dt}$, so an appreciation also raises the foreign-currency value of fixed export costs. This fixed-cost channel strengthens product selection but is not needed for the intensive-margin product-mix result.

Let product-level revenue per consumer be $r(q) = p(q)q$ and operating profit per consumer be $\pi(q) = [p(q) - c^e]q$. Using the first-order condition, the elasticities of output, revenue, and operating profit with respect to delivered marginal cost are

$$\frac{\partial \ln q}{\partial \ln c^e} = -\frac{1}{\varepsilon_\varphi(q)}, \qquad \frac{\partial \ln r}{\partial \ln c^e} = -\frac{1-\varepsilon_p(q)}{\varepsilon_\varphi(q)}, \qquad \frac{\partial \ln \pi}{\partial \ln c^e} = -\frac{1-\varepsilon_p(q)}{\varepsilon_p(q)}. \tag{9}$$

Combining equations (7) and (9), an appreciation reduces output and revenue for all exported products when $\alpha_j < 1$. The central issue is whether all products contract proportionally. Under constant-elasticity demand, they do. Under MSLD and MSLD', they do not.

3.4 Currency Appreciation and Product-Mix Reallocation

Consider two products m and n exported by the same firm to the same destination, with $m < n$. Product m is closer to the firm's core competence. Hence $z_m < z_n$, $c^e_{fmdt} < c^e_{fndt}$, and $q_{fmdt} > q_{fndt}$. Define

$$G(q) \equiv \frac{1-\varepsilon_p(q)}{\varepsilon_\varphi(q)}.$$

Under MSLD and MSLD', $G(q)$ is strictly decreasing over the relevant output range:

$$G'(q) = \frac{-\varepsilon_p'(q)\varepsilon_\varphi(q) - [1-\varepsilon_p(q)]\varepsilon_\varphi'(q)}{\varepsilon_\varphi(q)^2} < 0.$$

Proposition 1 *Suppose demand satisfies MSLD and MSLD'. For any two products $m < n$ exported by the same firm to the same destination, a home-currency appreciation increases the revenue of the better-performing product relative to the worse-performing product. The magnitude of this reallocation is decreasing in the sectoral imported-input share α_j.*

Proof. Using equations (7) and (9) for products m and n,

$$\frac{\partial \ln(r_{fmdt}/r_{fndt})}{\partial A_{dt}} = (1-\alpha_j)[G(q_{fndt}) - G(q_{fmdt})] > 0. \tag{10}$$

Since $q_{fmdt} > q_{fndt}$ and $G'(q) < 0$, we have $G(q_{fndt}) > G(q_{fmdt})$. The expression is therefore positive whenever $\alpha_j < 1$. The term $(1-\alpha_j)$ scales the cost shock, so the reallocation effect is weaker when the imported-input share is higher. The same logic applies to physical quantities because

$$\frac{\partial \ln(q_{fmdt}/q_{fndt})}{\partial A_{dt}} = (1-\alpha_j)\left[\frac{1}{\varepsilon_\varphi(q_{fndt})} - \frac{1}{\varepsilon_\varphi(q_{fmdt})}\right] > 0.$$

Thus, appreciation reallocates both sales and output toward the firm's core products.

Corollary 1 *Holding the product set fixed, a home-currency appreciation increases the concentration of export sales toward better-performing products.*

Let the skewness of firm f's export sales to destination d be measured by the Theil index

$$Theil_{fdt} = \frac{1}{N_{fdt}} \sum_{m \in M_{fdt}} \frac{r_{fmdt}}{\bar{r}_{fdt}} \ln\left(\frac{r_{fmdt}}{\bar{r}_{fdt}}\right), \qquad \bar{r}_{fdt} = \frac{1}{N_{fdt}} \sum_{m \in M_{fdt}} r_{fmdt}. \tag{11}$$

Suppose products can be ordered so that better-performing products have weakly larger pre-shock sales, and the appreciation induces a monotone increase in relative revenue shares toward lower-m products. Then $\partial Theil_{fdt}/\partial A_{dt} > 0$. The model can also generate product pruning at the extensive margin. Product m is exported if and only if $L_d \pi(q_{fmdt}) \geq f^{ex}_{jdt}$. Since

operating profit falls with the delivered marginal cost, an appreciation lowers $L_d\pi(q_{fmdt})$ and tightens the profitability condition. If fixed export costs are paid in home currency, appreciation also raises f^{ex}_{jdt}, further strengthening product selection. The empirical change in sales skewness should therefore be interpreted as the net effect of intensive-margin reallocation among continuing products and extensive-margin product selection.

Remark 1 *If demand has constant elasticity, then $\varepsilon_p(q)$ and $\varepsilon_\varphi(q)$ are constants. In that case $G(q)$ is constant and $\partial \ln(r_{fmdt}/r_{fndt})/\partial A_{dt} = 0$. A common proportional cost shock changes the scale of exports but not the relative sales of products within the firm. Thus, variable demand elasticities are essential for the product-mix mechanism.*

3.5 From Product-Mix Reallocation to Firm Productivity

We now map product-mix reallocation into firm-level measured, or aggregate, productivity. Because different products may be recorded in different physical units, the aggregation below should not be read as adding raw physical quantities across unrelated products. Instead, Q_{fmt} denotes product m's real output expressed in a common within-firm accounting unit, such as base-period value or a model-based real output-index unit. Product m is produced with a linear technology in common real-output units, $Q_{fmt} = a_{fm}V_{fmt}$, where V_{fmt} is the composite variable input allocated to product m. Total measured firm output, total composite input, and firm-level measured productivity are

$$Q_{ft} = \sum_{m\in M_{ft}} Q_{fmt}, \qquad V_{ft} = \sum_{m\in M_{ft}} \frac{Q_{fmt}}{a_{fm}}, \qquad \Phi_{ft} = \frac{Q_{ft}}{V_{ft}} = \frac{1}{\sum_{m\in M_{ft}} s^Q_{fmt}/a_{fm}}, \tag{12}$$

where $s^Q_{fmt} = Q_{fmt}/\sum_{k\in M_{ft}} Q_{fkt}$. Firm-level measured productivity is therefore a share-weighted harmonic aggregate of product-level productivities. Since $a_{fm} = \phi_f/z_m$ and z_m is increasing in m, output shares placed on lower-m products receive higher product-level productivity weights.

Proposition 2 *Suppose demand satisfies MSLD and MSLD', and products are ordered by distance from the firm's core competence. Conditional on firm survival, a home-currency appreciation raises the*

firm-level measured productivity of multi-product exporters through within-firm product-mix reallocation.

Proof. By Proposition 1, an appreciation shifts output shares from higher-m, lower-productivity products toward lower-m, higher-productivity products. In equation (12), this shift lowers $\sum_m s^Q_{fmt}/a_{fm}$ because a_{fm} is higher for lower-m products. Hence aggregate firm productivity Φ_{ft} rises. Product pruning is consistent with the same selection toward higher-productivity products when marginal low-productivity products are removed from the exported product set.

The productivity effect is a composition effect in firm-level measured productivity. Product-level technologies a_{fm} need not change. The firm becomes more productive in the aggregate because a larger share of its measured real output and input use is concentrated in products with higher product-level productivity. This mechanism is absent for single-product exporters, for which no within-firm product-mix margin exists.

3.6 Comparative Statics and Empirical Mapping

The exchange-rate-induced marginal-cost shock applies to the firm's foreign-market activity. Let $X_f \in [0, 1]$ denote the firm's exposure to export markets, measured as the share of production or sales subject to the foreign-currency cost shock. Let $R_{fjt} > 0$ summarize the strength of the product-mix reallocation channel among the firm's exported products. Sectoral reallocation frictions may weaken the product-mix response. Let $\mathcal{A}_j \in (0, 1]$ denote sectoral allocation efficiency: a higher $\mathcal{A}_j$ means that firms can more easily move labor, managerial attention, and other variable resources toward better-performing products. We use inverse TFP dispersion as an empirical proxy for this allocation efficiency.

Under variable-elasticity demand, markups are endogenous. The product-level markup is $\mu(q) = p(q)/c^e = 1/[1 - \varepsilon_p(q)]$. Firms with stronger market positions have a larger markup cushion with which to absorb cost shocks. Let S_f denote firm f's export-market share, interpreted as a predetermined or pre-shock proxy for the strength of its market position. Suppose that a fraction $\eta(S_f)$ of the exchange-rate-induced cost shock can be absorbed through markup

adjustment, with $0 \leq \eta(S_f) < 1$ and $\eta'(S_f) > 0$. The effective cost shock inducing quantity and product-mix adjustment is then $[1 - \eta(S_f)](1 - \alpha_j)A_t$. Combining export exposure, imported-input hedging, sectoral allocation efficiency, and markup cushions gives

$$\frac{\partial \ln \Phi_{ft}}{\partial A_t} = X_f(1 - \alpha_j)\mathcal{A}_j[1 - \eta(S_f)]R_{fjt}. \tag{13}$$

This expression delivers the empirical predictions used below:

$$\frac{\partial \ln \Phi_{ft}}{\partial A_t} > 0, \qquad \frac{\partial Theil_{fdt}}{\partial A_{dt}} > 0,$$
$$\frac{\partial^2 \ln \Phi_{ft}}{\partial A_t \partial X_f} > 0, \qquad \frac{\partial^2 \ln \Phi_{ft}}{\partial A_t \partial \alpha_j} < 0,$$
$$\frac{\partial^2 \ln \Phi_{ft}}{\partial A_t \partial \mathcal{A}_j} > 0, \qquad \frac{\partial^2 \ln \Phi_{ft}}{\partial A_t \partial S_f} < 0.$$

The first implication states that appreciation raises the measured productivity of surviving multi-product exporters through within-firm composition effects. The second states that appreciation increases the skewness of export sales toward better-performing products, with the clean theoretical prediction applying to intensive-margin reallocation among continuing products. The remaining implications describe how the productivity response varies with export exposure, imported-input hedging, sectoral reallocation efficiency, and market-share-based markup cushions.

The RMB exchange-rate regime reform is the common appreciation shock A_t. The post-reform dummy T is the empirical counterpart of the realization of this shock. Exporter status and pre-reform export share proxy for the exposure parameter X_f. Strictly, the model's mechanism applies most directly to surviving multi-product exporters. The exporter interactions in the full sample should therefore be interpreted as average exposure effects, with the effect expected to be stronger among firms exporting multiple products. Since non-exporters are not directly affected by the foreign-currency cost-shock and product-mix mechanism, the coefficients on the post-reform exporter interactions should be positive.

The product-reallocation channel is mapped to the firm-destination Theil index. The pre-

reform net currency exposure of firm f in destination d is an empirical proxy for the model's net effective cost pressure. Export receipts in destination d capture exposure to the appreciation shock, while imports from the same currency area partially offset the shock by lowering the home-currency cost of imported inputs. Therefore, firm-destination pairs with larger positive proxied net exposure should display a larger increase in export-sales skewness after the reform.

The mapping also clarifies the role of imported inputs. Appreciation can make imported inputs cheaper and may improve productivity directly through cheaper, higher-quality, or more varied intermediate inputs. The model does not rule out this direct imported-input channel. It isolates a separate natural-hedge channel: a higher import share weakens the net cost pressure faced by exporters and therefore dampens the product-mix response. The negative heterogeneity prediction for imported-input intensity is interpreted as evidence that, for the reallocation mechanism studied in this paper, the natural-hedge channel dominates the direct imported-input productivity channel.

4 Dataset and its Description

We use detailed firm- and product-level trade data for our empirical analysis.

4.1 Firm-level Data

The firm-level data comes from the Annual Survey of Industrial Firms Data published by the National Bureau of Statistics of China. The dataset covers all state-owned enterprises and non-state-owned enterprises in the industrial sector with annual sales of RMB five million or more. The dataset includes a comprehensive set of variables like profit, loss statements, firms identity code, sales, ownership, employment, fixed capital, total output, intermediate inputs, and value added, which allows us to calculate the total factor productivity (TFP) of each firm, using methods from Olley and Pakes (1996) and Levinsohn and Petrin (2003).

To clean the data, We follow Yu (2015) and drop an observation if one of the following criteria is met: (1) the total number of workers in a firm is less than eight; (2) Missing or negative

values are reported for any of the following variables: sales, total employment, total assets, fixed assets, current assets, the net value of fixed assets, intermediate inputs, total output, and wages. (3) Current assets exceeding total assets, fixed assets exceeding total assets, or the net value of fixed assets exceeding total assets; (4) The value-added to sales ratio is negative or larger than 1; (5) The firm is a non-manufacture firm. Based on this cleaned data set, we construct an unbalanced panel of firms that existed before and after the RMB exchange rate reform in 2005. We conduct a subsequent analysis of the panel for two reasons. First, this paper aims to study firm productivity changes before and after the exchange rate reform. Second, we want to explore surviving exporters' performance through the reallocation mechanism.

4.2 Product-level Data

The product-level trade data is from the Chinese Customs Trade Statistics conducted by Chinas General Administration of Customs. The dataset provides rich information about each trading firms transactions, including export and import product list, destination country, products unit, quantity, and value at the HS eight-digit level. More importantly, the dataset also includes each transactions trade type, such as processing with supplied materials or processing with imported materials.

Processing trade plays a vital role in Chinas export activities. However, Dai, Maitra and Yu (2016) finds that processing exporters are fundamentally different from non-processing exporters and also less productive than non-processing exporters and non-exporters. We need to remove processing-trade firms from our dataset because processing-trade firms may be exempted from the effect of the RMB exchange rate movements and, therefore, violate the parallel trend assumption. Following Liu and Qiu (2016), firms whose average processing export ratio is higher than 0.5 are dropped from our dataset[1].

[1]The processing export ratio of a firm is calculated by dividing a firms total value of its processing-export trade transactions by its total export value over the same period. The average processing export ratio is the average of the ratios for each year during period of 2002 to 2007.

4.3 Merged Data Set

Following Yu (2015), we use each firms Chinese name, postcode, and the last seven digits of its phone number to match the data from the above datasets. Then, We delete the observations which are unmerged from Chinese Customs Trade Statistics. Note that we need non-exporting firms as a control group for our analysis. Therefore, we need to preserve the unmerged sample from the Annual Survey of Industrial Firms Data. Finally, Table 1 reports the summary statistics of the key variables.

5 Empirical Analysis

5.1 Empirical Specification

The announcement of China's exchange rate reform in 2005 took the market by surprise, which allows us to utilize DID empirical design. The appreciation of the RMB during the post-reform period of 2005 to 2007 can be regarded as a quasi-natural experiment. To avoid the potential influences of Chinas entry into the WTO in 2001 or the financial crisis of 2008, we take the period of 2002 to 2007 as our sample period and divide it into two stages, the pre-reform period (20022004) and the post-reform period (20052007). Next, we categorize firms into exporters and non-exporters. We consider exporters as the treatment group and non-exporters as the control group. We then define exporters into three types: 1) a firm is an exporter if it took up the exporting trade from 2002 to 2004, during which the RMB exchange rate remained nearly constant (named *Treat*1); 2) a firm is an exporter if it kept exporting during the entire sample period (named *Treat*2); 3) A firm is an exporter based on its average export share (the export share is calculated by dividing the firms total export value by its sales) from 2002 to 2004 (named *Share*).

The empirical analysis includes four parts. First, our baseline regressions demonstrate results consistent with our main hypothesis. Second, we study the potential channels: reallocation among an exporter's different products. Third, we continue to test our hypothesis by con-

ducting various heterogeneity tests, including sector, export concentration and market share heterogeneity. The last part is the robustness checks, such as Propensity Score Matching and Difference-In-Difference (PSM-DID) regressions, placebo tests, and Instrument Variables (IV) approach to address endogeneity issues.

Our baseline empirical specification is designed to test the causal impact of RMB exchange rate reform on exporters' total factor productivity:

$$Y_{ft} = \beta_0 + \beta_1 T \times \text{Treat1}_f + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft} \tag{14}$$

$$Y_{ft} = \beta_0 + \beta_1 T \times \text{Share}_f + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft} \tag{15}$$

$$Y_{ft} = \beta_0 + \beta_1 T \times \text{Treat2}_f + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft} \tag{16}$$

In equations (14), (15), and (16), Y_{ft} represents the TFP for firm f in year t, measured by the OP method (TFP^{OP}) and LP method (TFP^{LP}). T is a dummy variable indicating the post-reform period; more specifically, it takes the value of 0 for all the years before 2005 and the value of 1 for all years from 2005 onwards. $Treat1_f$ is a dummy variable indicating whether firm f was an exporter during the pre-reform period; it takes the value of 1 for firms engaged in export and 0 for non-exporters during this time. $Share_f$ is the average export value divided by sales for firm f during the pre-reform period; it takes the value of 0 for non-exporters during this time. $Treat2_f$ is a dummy variable indicating whether firm f is an exporter during the whole sample period; it takes the value of 1 for exporters and the value of 0 for non-exporters based on the entire sample period. $T \times Treat1_f$, $T \times Share_f$ and $T \times Treat2_f$ represent the interactions between the time variable T and each exporter variable. The year fixed effect δ_t controls for time trends and any other possible time-specific shocks, while the firm-fixed effect θ_f captures the time-invariant firm characteristics. We also include time-varying industry and firm characteristics, which might be associated with the TFP of firms. The control variable X_{sft} consists of the Herfindahl-Hirschman Index (HHI), the total export values, and total sales of each industry; it also consists of the human capital (measured by the average wage), the fixed capital-labor ratio,

the scale (measured by sales) and the SOE share (measured by the registered capital share of state ownership) of each firm.

5.2 Baseline Results

Table 2 reports the results of the baseline regression, with the pre-reform exporters in columns 1 and 2, the average export share of the pre-reform period in columns 3 and 4, and with the full-period exporters in columns 5 and 6. The coefficients of all the interaction terms are positive and both statistically and economically significant. The results show that, compared to non-exporters, firms engaged in export before the reform are exposed to a greater competition shock as a result of the RMB exchange rate reform, hence improving their TFP significantly. These results are consistent in various definitions of exporters. Firms with higher export value compared with their sales before the reform, also experience a greater TFP gain after the reform. The TFP of firms engaged in export throughout the whole sample period also increase more than that of non-exporters. In addition, using a different measurement of the TFP does not affect these results, which indicates the robustness to using either the OP method or the LP method.

More specifically, the coefficients of 0.0172 and 0.0140 on the interaction terms in columns 1 and 2 suggest that, after the RMB exchange rate reform, the improvement in the TFP^{OP} of exporters ($Treat1 = 1$) is 1.72% larger than that of non-exporters ($Treat1 = 0$) and the improvement in the TFP^{LP} of exporters ($Treat1 = 1$) is 1.40% larger than that of non-exporters ($Treat1 = 0$). Similarly, the coefficients of the interaction terms in columns 3 and 4 show that, with a 1% increase in the average export share, the TFP^{OP} and TFP^{LP} of exporters are 0.04% and 0.03% higher than those of non-exporters, respectively. As for those exporters who keep exporting throughout the whole sample period, the post-reform increase in their TFP^{OP} and TFP^{LP} ($Treat2 = 1$) are 2.68% and 2% higher than that of non-exporters ($Treat2 = 0$), respectively.

To summarize, the results of the main regression provide direct evidence that those exporters, exposed to a higher competitive pressure after the RMB appreciation, manage to in-

crease their productivity to a greater extent than non-exporters.

5.3 Channel Analysis

We further explore the potential channel by using product-level trade data. More specifically, it is hypothesized that exporters reallocate resources towards better-performing products, hence increasing the skewness of firm f's exports to destination d after the reform. We use the Theil index to measure the skewness (computed over all N_{fdt} products that firm f exports to d in year t, x_{fdt}):

$$Theil_{fdt} \equiv \frac{1}{N_{fdt}} \sum \frac{x_{fdt}}{\overline{x}_{fdt}} log(\frac{x_{fdt}}{\overline{x}_{fdt}}), \overline{x}_{fdt} \equiv \frac{\sum x_{fdt}}{N_{fdt}} \tag{17}$$

Figure 2 and 3 show the time trend and the quantile time trend of the theil index at the firm-destination level from 2002 to 2007 respectively. Overall, the time trend of the theil index for each exporter to all destinations implies an increase in skewness of firm export sales to a destination after the year 2005.

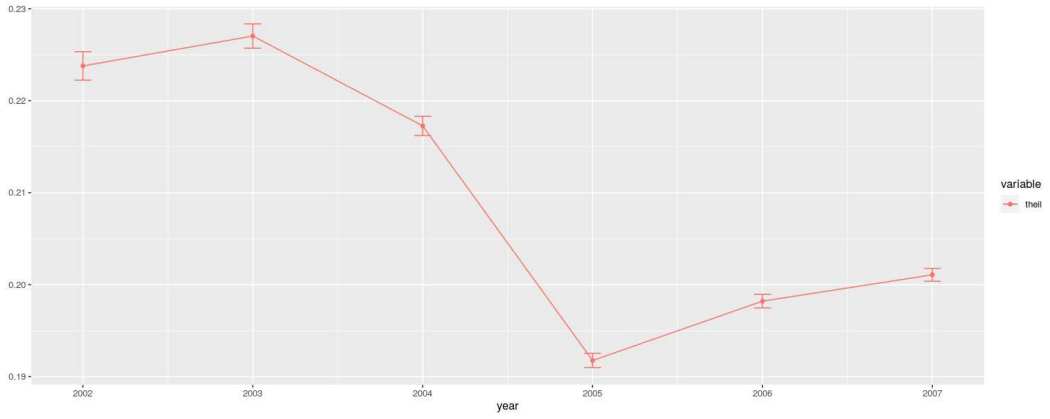


Figure 2: Time Trend

We further use the following specification to study the reallocation of the products within a firm:

$$\Delta Theil_{fd} = \beta_0 + \beta_1 Exposure_{fd} + \theta_f + \delta_d + \varepsilon_{fd}, \tag{18}$$

Here $\Delta Theil_{fd}$ represents the change of the theil index for the exports of firm f to destination d

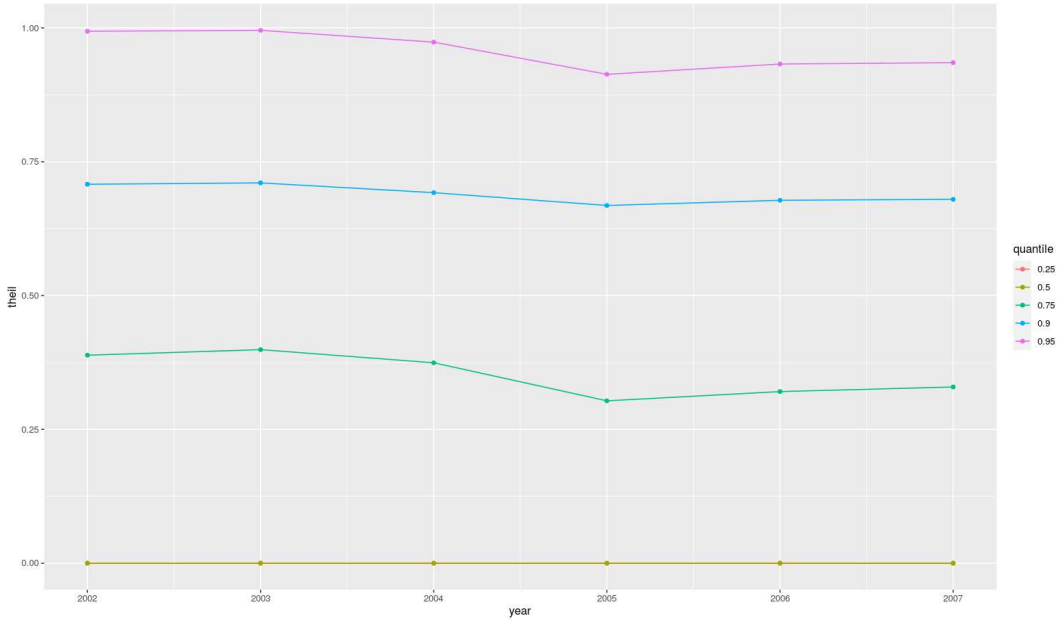


Figure 3: Quantile Time Trend

during the period 2004-2007, 2002-2007, and 2004-2006 respectively, and $Exposure_{fd}$ represents the net currency exposure of a firm before the exchange rate reform, which implies the extent to which the appreciation of home currency leads to increased competitive pressure.

Following Ekholm, Moxnes and Ulltveit-Moe (2012), we define the net currency exposure $Exposure_{fd}$ as follows:

$$Exposure_{fd} = \frac{\sum(\frac{ExportValue_{fdt}}{\pi_{ft}} - \frac{ImportValue_{fdt}}{OperationCost_{ft}})}{N}, \tag{19}$$

where t is from the year 2002 to 2004, N is the number of years that the firm f exports to the destination d before the reform, $ExportValue_{fdt}$ is firm f's export to destination d at time t, $ImportValue_{fdt}$ is firm f's import from destination d at time t, π_{ft} is firm f's profit at time t and $OperationCost_{ft}$ is firm f's operation cost at time t. A positive value implies that the effect of home currency appreciation leads to increased competitive pressure that exporters are exposed to and vice versa.

Table 3 reports regressions of this skewness measure on the exposure of each exporter at the firm-destination level. In columns 1, 3 and 5, we use firm fixed effects to isolate the varia-

tion within exporters over time. In columns 2, 4 and 6, we add the destination fixed effects to separate the variation within destinations. Across all the columns, we see that positive exposure to the appreciation induces a significant increase in the skewness of firm export sales to a destination. The significant positive effect exists through the whole sample period, and the significance level is at the 1% level.

5.4 Heterogeneity Tests

In this section, we conduct a series of regressions to explore the possible heterogeneous effects of the RMB reform on the performance of firms. Results are reported in Tables 4, 5, and 6.

5.4.1 Sector Heterogeneity

Firstly, we analyze how sector TFP dispersion might affect the baseline results. Hsieh and Klenow (2009) show that, theoretically, if there is no distortion or misallocation, the TFP level of all firms should be equal. Therefore, we use the TFP dispersion to measure the misallocation degree in each sector.

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Std_{st} + \beta_2 T \times Treat1_f + \beta_3 T \times Std_{st} + \beta_4 Treat1_f \times \\ Std_{st} + \beta_5 T \times Treat1_f \times Std_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}, \end{aligned} \tag{20}$$

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Std_{st} + \beta_2 T \times Share_f + \beta_3 T \times Std_{st} + \beta_4 Share_f \times \\ Std_{st} + \beta_5 T \times Share_f \times Std_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}, \end{aligned} \tag{21}$$

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Std_{st} + \beta_2 T \times Treat2_f + \beta_3 T \times Std_{st} + \beta_4 Treat2_f \times \\ Std_{st} + \beta_5 T \times Treat2_f \times Std_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}. \end{aligned} \tag{22}$$

Here Y_{sft} is the TFP-level of firm f in industry s for year t, measured with either the OP method (TFP^{OP}) or the LP method (TFP^{LP}). Std_{st} is the inverse value of the standard devia-

tion for the TFP-level in industry s and year t, and it can represent the efficiency of resource allocation in a particular industry. As the Std_{st} increases, the degree of misallocation within the sector decreases. $T \times Std_{st}$ is the interaction between the time dummy T and the variable Std_{st} for industry s in year t. $Treat1_f \times Std_{st}$, $Share_f \times Std_{st}$, and $Treat2_f \times Std_{st}$ are the interactions between the standard deviation variable Std_{st} and the three types of exporter variables. $T \times Treat1_f \times Std_{st}$, $T \times Share_f \times Std_{st}$, and $T \times Treat2_f \times Std_{st}$ are the interactions between the time variable T, the three types of exporter variables, and the standard deviation variable Std_{st}. Finally, X_{sft} is a set of control variables, as previously outlined.

We run regressions based on equations (24), (25), and (26) and report results in Table 4. The coefficients of β_5 are significantly positive for all columns, which means the efficiency in resource allocation increases the TFP of exporters after the reform. Specifically, the results of columns 1, 2, and 3 show that, as the standard deviation of TFP^{OP} decreases by 1 unit, the positive effect of the reform on TFP^{OP} increases by 10.9%. The results reported in columns 4, 5, and 6 also show the similar impact of the reform on TFP^{LP}. Overall, the positive effects of the currency appreciation on firms' TFP are much stronger in the more efficient sectors.

Amiti, Itskhoki and Konings (2014) conclude that the intensity of import can mitigate the negative effects of home currency appreciation, which indicates that the competitive pressure of the RMB appreciation can be lessened by the sector import shares. To further explore sector heterogeneity, we use the differences in import shares across sectors as follows:

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Imp_{st} + \beta_2 T \times Treat1_f + \beta_3 T \times Imp_{st} + \beta_4 Treat1_f \times \\ Imp_{st} + \beta_5 T \times Treat1_f \times Imp_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}, \end{aligned} \tag{23}$$

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Imp_{st} + \beta_2 T \times Share_f + \beta_3 T \times Imp_{st} + \beta_4 Share_f \times \\ Imp_{st} + \beta_5 T \times Share_f \times Imp_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}, \end{aligned} \tag{24}$$

$$\begin{aligned} Y_{ft} = \beta_0 + \beta_1 Imp_{st} + \beta_2 T \times Treat2_f + \beta_3 T \times Imp_{st} + \beta_4 Treat2_f \times \\ Imp_{st} + \beta_5 T \times Treat2_f \times Imp_{st} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft}. \end{aligned} \tag{25}$$

Here, Imp_{st} denotes the aggregate imported value divided by the sales for industry s in year t. Industries with a higher import share appear to suffer less from the appreciation after the reform, because they can import more foreign input at a lower cost. These results are reported in Table 5, with the estimated value of β_5 being negative and significant at the 1% level, supporting this papers hypothesis.

5.4.2 Market Share for Exporters

The last section of the heterogeneity analysis is about the market share and makeups. Firms with a higher market share adjust their makeup more in response to cost shocks due to the RMB appreciation (Amiti, Itskhoki and Konings, 2014). Therefore, as exporters with higher exporting market shares prefer to adjust their price rather than reallocate quantities between products, the positive impact of the reform on their TFP could be reduced. The market share variables are constructed as follows:

$$S_{fict} = \frac{ExportValue_{fict}}{\sum_{fict \in \Omega} ExportValue_{fict}}, \tag{26}$$

where Ω denotes the set of exported products to destination c, by Chinese firms f at time t. Therefore, S_{fict} measures the market share of product i from the Chinese firm f to destination c at time t relative to all other Chinese exporters. Note that S_{fict} is a measurement at the product-destination level. Finally, Table 6 shows the results with market share difference between firms using the following specification:

$$Y_{ft} = \beta_0 + \beta_1 MarketShare_{ft} + \beta_2 T \times MarketShare_{ft} + X_{sft} + \theta_f + \delta_t + \varepsilon_{ft} \tag{27}$$

where $MarketShare_{ft}$ represents the aggregate market share for all products of exporter f at time t. The export value of each product is used as the weight to compute firm-level shares.

After controlling for other variables, the coefficients of interaction terms reported in columns 2 and 4 of Table 6 are significantly negative. Specifically, a 1% increase in an exporters market share leads to an approximately 7.30% decrease for exporters at the TFP^{OP} level and an ap-

proximately 5.63% decrease at the TFP^{LP} level; this provides strong support for the theoretical predictions of this paper.

5.5 Robustness Tests

Four sets of robustness tests are presented in this section. First, the PSM-DID method is used to match participants to nonparticipants. Second, we drop the observations from year 2002 and from single-product exporters. Third, we use a different treatment year to conduct a placebo test. Fourth, we use the firms distance to the nearest port as an instrumental variable to address potential endogeneity problems.

5.5.1 The PSM-DID Method

The PSM-DID method is used as a robustness test to overcome other potential differences in trends between the treatment and the control group. Logic regressions are conducted on the treatment dummy variables $Treat1_f$ and $Treat2_f$, then the firms fixed capital, average wage, sales, and SOE ownership shares are used as covariates to obtain four propensity scores. The treatment and the control group are matched using the one-to-one nearest neighbor matching method.

In addition, balance tests need to be conducted to check whether the treatment and control groups are balanced across the co-variables after the matching. Table 7 shows the results of these balance tests, while Figure 4 depicts the propensity scores for each treatment group. After passing the balance tests, we run the DID regressions based on the matched groups. The results are reported in Table 8. These results are consistent with the baseline results, thus showing that the baseline results are robust to PSM-DID model.

5.5.2 Subsample Regressions

China successfully joined the WTO in December 2001, after which there was a drastic reduction in the Chinese tariff rate. The simple average input tariff rates dropped from 17% in 2000 to

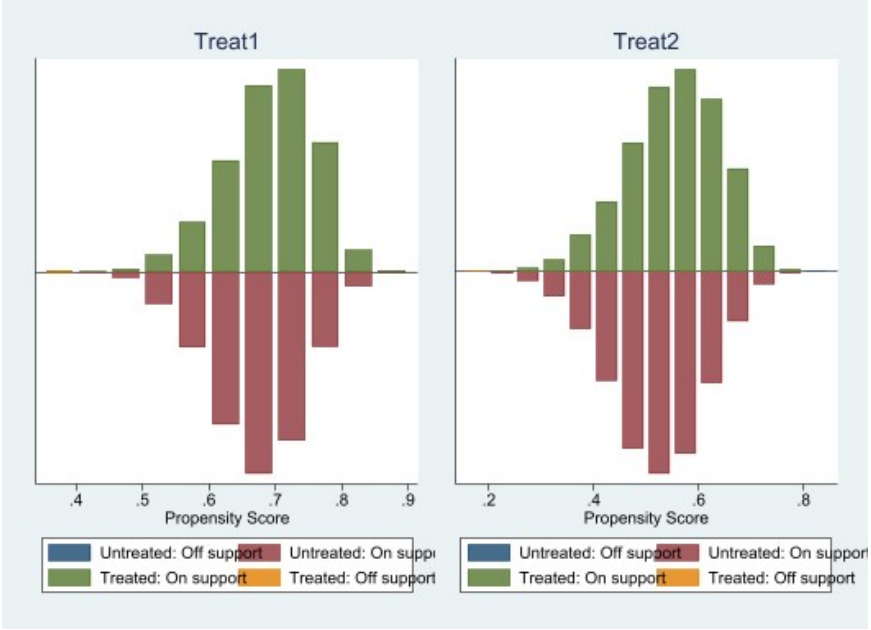


Figure 4: The Propensity Score Histogram

9.8% after joining the WTO. As Feenstra (1989) shows, this input tariff reduction could have similar effects with currency appreciation. In order to eliminate the potential influence of tariff reduction and to ensure that these papers results are indeed based on the 2005 RMB reform, all observations from 2002 are excluded from the sample. The results reported in Table 9 remain positive.

We conduct an additional test by excluding those firms with only one export product during the sample period. The results are shown in Table 10. The results remain positive and statistically significant, which supports the baseline results.

5.5.3 Placebo Tests

We conduct the placebo tests to ensure the year 2005 is the right dividing year to examine the effect of the RMB appreciation on the productivity of firms. As the reform was adopted in 2005, one should not expect a significant effect in the years after 2005; otherwise there may be some underlying factors influencing the TFP of firms. Accordingly, $T \times Treat1_f$ is replaced by $T1 \times Treat1_f$ and $T2 \times Treat1_f$ in the equations of the main regressions, where $T1 \times Treat1_f$ and $T2 \times Treat1_f$ represent the interaction between the dummy variables for 2006 and 2007 with

the treatment variable, respectively. The estimates are given in Table 11. Except for the effect reported in column 1, which is positive and statistically significant at the 10% level, all other coefficients are positive but not significant.

5.5.4 The Instrument Variable Method

Exporters engaged in general trade typically possess a higher TFP than other exporters. Therefore, the variables included in the interactions of the main regressions are endogenous. Due to this, a firms distance from the nearest Chinese main port (i.e., Tianjin, Shanghai, or Hong Kong) is used as an instrumental variable (IV) to address this endogeneity problem. As those firms that are farther away from ports have to overcome higher transportation costs, the instrumental variable is expected to closely correlate with a firms export status.

Table 12 reports the results of the IV regressions. To ensure that the instrumental variable is an effective one, a series of additional tests are conducted. The Kleibergen-Paap rk LM-statistic is employed to assess whether the instrument is correlated with the endogenous variables of interest. According to the results reported in Table 12, the null hypothesis for under-identification is rejected at the 0.01 significance level. Second, the Cragg-Donald Wald F-statistic is used to test whether the instrumental variable is a weak instrument. Table 12 also shows that the null hypothesis is rejected at the 1% significance level. We also perform the over-identification test. The null hypothesis is that the instruments are valid. This hypothesis can be confirmed since the value of Hansens J-statistic is 0.000.

These results show that the positive effect of the RMB reform remains significant even after addressing several possible endogeneity issues. In the first stage, we can see that the distance from the nearest port appears to be negatively correlated with a firms export status. The significant coefficient supports the use of this instrumental variable. In the second stage, after replacing the interaction terms with the estimated values from the first stage, the coefficients of these interaction terms remain positive and significant at 1% level. This is consistent with the baseline results and proves that the results are not driven by endogeneity issues.

5.5.5 Other Competing Hypothesis

In this section, we try to test other potential mechanisms that may confound the effect on exporters' productivity induced by the appreciation of home currency. Exporters also import intermediate inputs during the time of home currency appreciation to obtain cheaper intermediate goods or inputs with higher quality. Several studies (Halpern, Koren and Szeidl, 2015; Kasahara and Rodrigue, 2008; Topalova and Khandelwal, 2011) find that the declines in input tariffs are conducive to productivity gains through importing the cheaper inputs. Using Indonesian manufacturing census data from 1991 to 2001, Amiti and Konings (2007) find that a 10 percentage point fall in input tariffs leads to a productivity gain of 12 percent for firms via learning, variety, and quality effects of importing cheaper inputs. The appreciation of home currency will also let exporters enjoy the benefits of cheaper inputs as the reduced input tariffs do. Therefore, we need to further control the import value of firms to separate the channel of reallocation within firms. Based on the specification of baseline regressions, we add the import value divided by operating costs for each firm f at year t as a control variable $Import$ to control the effect of cheaper inputs, and the results are reported in Table 13. Consistent with those of the main regressions, the coefficient β of the interaction term is significantly positive at least at the 10% confidence level. The results exclude the competing channel that exporters may import cheaper inputs to ease the increasing competitive pressure brought by the home currency appreciation.

6 Concluding Remarks

This paper provides micro-level evidence for the positive consequences of domestic currency appreciation on firm productivity. Applying firm-level data from Chinese manufacturing firms between 2002 and 2007, we exploit the 2005 China's exchange rate regime reform as a quasi experiment, which allows us to conduct DID regressions. The analyses show that firms engaged in export either before the reform or throughout the whole sample period are associated with productivity growth. And firms with more export shares experience their productivity gain to

a greater extent.

To shed light on potential mechanisms, we employ product-level data to study the resource reallocation among the products within a firm. The results show that, upon the appreciation, exporters reacted by reallocating resources towards better-performing products. We also provide an open economy model to justify the impact of currency appreciation on exporter productivity, following Mayer, Melitz and Ottaviano (2020). By incorporating Marshalls Second Law of Demand into the model, we show how the exchange-rate-induced foreign-currency marginal-cost shock contracts non-core products more than core products. Therefore, exporters reallocate their resources towards better-performing products, and the resulting product-mix composition effect raises firm-level measured productivity.

Although many export-oriented firms and governments fear the potential loss from the appreciation of their domestic currency, the positive effect of such appreciation has been neglected for a long time. This paper highlights the importance of resource reallocation of multi-product exporters to exchange rate appreciation. In addition, our results survive a variety of robustness checks, thus avoiding potential endogeneity issues. Our findings raise alarm for those emerging market countries that rely on home currency depreciation to protect their infant industries and gain export competitiveness. In contrast, a structural exchange rate regime reform can implement an appropriate exchange rate system, which can be conducive to the long-term economic growth by forcing exporters to trim their fat and reallocate resources to their best use, hence increasing their productivity.

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A Appendix

Table 1: Descriptive Statistics

Variable	#Obs	Mean	Median	Std.Dev.	Min	Max
A: Variables in firm-year level						
TFPLP	231069	6.247	6.227	1.107	-4.765	11.701
TFPOP	231069	2.679	2.657	1.114	-10.602	18.468
Human	229683	5.162	5.081	1.012	2.890	8.187
KL	229147	4.199	4.230	1.178	0.961	7.152
Scale	229409	10.63	10.49	1.195	8.519	14.39
SOEShare	233567	0.041	0.000	0.176	0.000	1.000
B: Dummy variables for treatment and control groups in firm level						
Non-exporters	234087	0.311	0.000	0.463	0.000	1.000
Treat1	234087	0.479	0.000	0.500	0.000	1.000
Treat2	234087	0.265	0.000	0.441	0.000	1.000
C: Variables in industry-year level						
HHI	234087	0.009	0.005	0.010	0.002	0.380
IndSale	234087	19.123	19.179	0.896	14.576	20.994
IndExport	234087	17.499	17.656	0.971	9.262	19.484
TFPOP_Std	233807	-0.955	-0.916	0.190	-2.574	-0.030
TFPLP_Std	233807	-1.029	-0.994	0.156	-2.170	-0.043
IndImport	234087	0.059	0.051	0.039	0.000	0.711

Table 2: Baseline Regressions

	(1) TFP^{OP}	(2) TFP^{LP}	(3) TFP^{OP}	(4) TFP^{LP}	(5) TFP^{OP}	(6) TFP^{LP}
T_Treat1	0.0172**	0.0140**				
	(0.0075)	(0.0062)				
T_Share			0.0004***	0.0003***		
			(0.0001)	(0.0001)		
T_Treat2					0.0268***	0.0200***
					(0.0085)	(0.0075)
HHI	2.6532	-5.8500***	2.6575	-5.8377***	2.2438	-6.1368***
	(1.7634)	(1.4210)	(1.7688)	(1.4220)	(1.9006)	(1.6491)
IndSale	-0.3029***	-0.3154***	-0.3032***	-0.3158***	-0.3023***	-0.3140***
	(0.0421)	(0.0208)	(0.0421)	(0.0207)	(0.0431)	(0.0222)
IndExport	0.3729***	0.1372***	0.3743***	0.1386***	0.3728***	0.1432***
	(0.0520)	(0.0237)	(0.0521)	(0.0236)	(0.0536)	(0.0255)
Human	-0.9089***	-0.3552***	-0.9088***	-0.3551***	-0.9125***	-0.3565***
	(0.0112)	(0.0082)	(0.0112)	(0.0082)	(0.0116)	(0.0088)
KL	-0.3615***	-0.2524***	-0.3616***	-0.2526***	-0.3619***	-0.2511***
	(0.0060)	(0.0056)	(0.0060)	(0.0056)	(0.0065)	(0.0059)
Scale	0.9507***	0.9551***	0.9507***	0.9551***	0.9541***	0.9554***
	(0.0064)	(0.0058)	(0.0064)	(0.0058)	(0.0065)	(0.0060)
SOEShare	0.0246	0.0142	0.0242	0.0139	0.0158	0.0044
	(0.0163)	(0.0161)	(0.0162)	(0.0160)	(0.0212)	(0.0215)
_cons	-1.9542***	2.6630***	-1.9717***	2.6470***	-1.9980***	2.5309***
	(0.5780)	(0.3005)	(0.5774)	(0.2986)	(0.6105)	(0.3433)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Cluster	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year
Number of observations	171588	171588	170828	170828	125402	125402
R^2	.773	.777	.774	.778	.769	.774

Notes: This table examines the effect of exchange rate appreciation on exporters' TFP compared with non-exporters. *T_Treat1* is the interaction term between the time variable T and the exporter variable $Treat1_f$ which indicates whether firms exported during the pre-reform period. *T_Share* is the interaction term between the time variable T and the average export share variable $Share_f$. *T_Treat2* is the interaction term between the time variable T and the exporter variable $Treat2_f$ which indicates whether firms kept exporting during the entire sample period. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 3: Channel Analysis: Product Reallocation

	Period: 04-07		Period: 02-07		Period: 04-06	
	(1)	(2)	(3)	(4)	(5)	(6)
	Delta_Theil	Delta_Theil	Delta_Theil	Delta_Theil	Delta_Theil	Delta_Theil
Exposure	0.04227***	0.03800***	0.04213**	0.03766*	0.02596**	0.02321**
	(0.013)	(0.013)	(0.021)	(0.022)	(0.011)	(0.010)
_cons	0.05516***	0.05518***	0.08584***	0.08589***	0.04542***	0.04543***
	(0.004)	(0.000)	(0.007)	(0.000)	(0.004)	(0.000)
Firm_FE	YES	YES	YES	YES	YES	YES
Destination_FE	NO	YES	NO	YES	NO	YES
Cluster	Destination	Destination	Destination	Destination	Destination	Destination
N	76603	76595	36713	36693	84357	84348
r2_a	0.117	0.121	0.150	0.157	0.095	0.098

Notes: This table is about the reallocation of products within exporters. *Delta_Theil* is the change of Theil index during the according periods. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 4: Industry Heterogeneity: TFP dispersion

	(1) TFP^{OP}	(3) TFP^{OP}	(5) TFP^{OP}	(2) TFP^{LP}	(4) TFP^{LP}	(6) TFP^{LP}
T_Treat1	0.125***			0.096**		
	(0.037)			(0.048)		
T_Treat1_Std	0.109***			0.086*		
	(0.040)			(0.048)		
T_Share		0.003***			0.003***	
		(0.001)			(0.001)	
T_Share_Std		0.003***			0.002***	
		(0.001)			(0.001)	
T_Treat2			0.172***			0.152***
			(0.041)			(0.058)
T_Treat2_Std			0.149***			0.137**
			(0.043)			(0.058)
HHI	2.440	2.426	2.288	-5.758***	-5.741***	-6.185***
	(1.772)	(1.771)	(1.848)	(1.436)	(1.439)	(1.612)
IndSale	-0.297***	-0.296***	-0.297***	-0.312***	-0.312***	-0.311***
	(0.040)	(0.040)	(0.041)	(0.020)	(0.020)	(0.021)
IndExport	0.365***	0.365***	0.366***	0.140***	0.141***	0.147***
	(0.048)	(0.048)	(0.050)	(0.023)	(0.023)	(0.025)
Human	-0.909***	-0.909***	-0.913***	-0.356***	-0.356***	-0.357***
	(0.011)	(0.011)	(0.012)	(0.008)	(0.008)	(0.009)
KL	-0.361***	-0.362***	-0.362***	-0.253***	-0.253***	-0.252***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Scale	0.950***	0.951***	0.954***	0.956***	0.956***	0.957***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
SOEShare	0.027	0.027	0.018	0.012	0.012	0.001
	(0.017)	(0.016)	(0.021)	(0.016)	(0.016)	(0.021)
_cons	-1.959***	-1.958***	-2.006***	2.723***	2.714***	2.581***
	(0.567)	(0.563)	(0.601)	(0.301)	(0.299)	(0.345)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Cluster	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year
Number of observations	171581	170821	125397	171581	170821	125397
R^2	0.774	0.774	0.769	0.778	0.778	0.774

Notes: This table is about the industry heterogeneity. *T_Treat1_std*, *T_Share_Std*, and *T_Treat2_std* are the interactions between the time variable T, the three types of exporter variables, and the standard deviation variable Std_{st}. Single items*Std*, *Treat1_Std*, *Share_Std*, *Treat1_Std*, and *T_Std* are also included in the regressions, but unreported in the table. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 5: Industry Heterogeneity: Import Share

	(1) TFPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP	(5) TFPOP	(6) TFPLP
T_Treat1	0.032*	0.031***				
	(0.018)	(0.011)				
T_Treat1_IndImport	-0.428	-0.407**				
	(0.315)	(0.194)				
T_ExportShare			0.001***	0.001***		
			(0.000)	(0.000)		
T_ExportShare_IndImport			-0.014***	-0.008**		
			(0.004)	(0.003)		
T_Treat2					0.054***	0.045***
					(0.019)	(0.014)
T_Treat2_IndImport					-0.737**	-0.614***
					(0.329)	(0.222)
HHI	3.927**	-5.434***	3.868*	-5.430***	3.591*	-5.633***
	(1.966)	(1.475)	(1.968)	(1.478)	(2.159)	(1.722)
IndustrySale	-0.314***	-0.331***	-0.313***	-0.330***	-0.317***	-0.331***
	(0.043)	(0.022)	(0.042)	(0.022)	(0.044)	(0.024)
IndustryExport	0.415***	0.166***	0.414***	0.166***	0.419***	0.175***
	(0.051)	(0.026)	(0.051)	(0.025)	(0.054)	(0.028)
Human	-0.908***	-0.355***	-0.908***	-0.354***	-0.912***	-0.356***
	(0.011)	(0.008)	(0.011)	(0.008)	(0.012)	(0.009)
KL	-0.362***	-0.253***	-0.362***	-0.253***	-0.362***	-0.251***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Scale	0.951***	0.955***	0.952***	0.956***	0.954***	0.956***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
SOEShare	0.021	0.012	0.021	0.012	0.012	0.002
	(0.016)	(0.016)	(0.016)	(0.016)	(0.021)	(0.021)
_cons	-2.418***	2.472***	-2.429***	2.460***	-2.474***	2.315***
	(0.623)	(0.306)	(0.624)	(0.304)	(0.649)	(0.347)
Year_FE	YES	YES	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	171588	171588	170828	170828	125402	125402
r2_a	0.774	0.778	0.775	0.778	0.770	0.774

Notes: This table is about the industrial import share heterogeneity. *T_Treat1_IndImport*, *T_Share_IndImport*, and *T_Treat2_IndImport* are the interactions between the time variable T, the three types of exporter variables, and the import share of each industry Imp_{st}. Single items *IndImport*, *Treat1_IndImport, Share_IndImport, Treat2_IndImport* and *T_Imp* are also included in the regressions, but unreported in the table. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 6: Market Share Heterogeneity for Exporters

	(1) TFPOP	(2) TFPOP	(3) TFPLP	(4) TFPLP
MarketShare	0.1057***	0.0515***	0.1204***	0.0318***
	(0.0125)	(0.0108)	(0.0127)	(0.0104)
T_MarketShare	-0.0267*	-0.0730***	-0.0065	-0.0563***
	(0.0148)	(0.0146)	(0.0144)	(0.0136)
HHI		38.6222**		-44.8901
		(17.7736)		(27.9000)
IndSale		-0.1926***		-0.1302***
		(0.0251)		(0.0191)
IndExport		0.2532***		0.0595***
		(0.0377)		(0.0190)
KL		-0.3734***		-0.2589***
		(0.0084)		(0.0085)
Scale		0.9586***		0.9574***
		(0.0100)		(0.0094)
Human		-0.9264***		-0.3697***
		(0.0143)		(0.0129)
SOEShare		0.0359		0.0290
		(0.0260)		(0.0260)
_cons	2.6938***	-2.0448***	6.3218***	0.7648**
	(0.0076)	(0.5834)	(0.0073)	(0.3487)
Year_FE	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	60324	56492	60324	56492
r2_a	.66656469	.7843677	.682913	.78989741

Notes: This table is about the market share heterogeneity for firms. *MarketShare*is a firm's export market share. *T_MarketShare* is the interaction between the time variable T and $MarketShare_{ft}$. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 7: Balance Test of PSM

Variables	Umatched/ Matched	Treat1				Treat2			
		Mean		t-test		Mean		t-test	
		Treated	Control	t	$p > \|t\|$	Treated	Control	t	$p > \|t\|$
K	U	9.015	8.750	14.63	0.000	8.945	8.750	9.24	0.000
	M	9.015	9.050	-2.02	0.044	8.946	8.969	-0.98	0.328
SOEShare	U	0.035	0.041	-2.88	0.004	0.029	0.041	-5.47	0.000
	M	0.035	0.038	-1.46	0.143	0.029	0.033	-1.73	0.083
Human	U	5.295	4.901	35.07	0.000	5.307	4.901	31.31	0.000
	M	5.295	5.298	-0.36	0.718	5.307	5.319	-0.92	0.359
Scale	U	10.583	10.274	23.71	0.000	10.574	10.274	19.99	0.000
	M	10.583	10.614	-2.49	0.013	10.574	10.572	0.11	0.912

Table 8: PSM-DID Regressions

	(1) TfPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP
T_Treated	0.0183**	0.0149**	0.0275***	0.0215***
	(0.0076)	(0.0064)	(0.0085)	(0.0075)
HHI	2.4726	-5.8995***	1.9623	-6.4375***
	(1.8419)	(1.4359)	(1.9702)	(1.6677)
IndustrySale	-0.3023***	-0.3143***	-0.2977***	-0.3097***
	(0.0425)	(0.0207)	(0.0436)	(0.0220)
IndustryExport	0.3701***	0.1363***	0.3659***	0.1390***
	(0.0529)	(0.0239)	(0.0543)	(0.0255)
Human	-0.9049***	-0.3514***	-0.9101***	-0.3548***
	(0.0110)	(0.0081)	(0.0115)	(0.0088)
KL	-0.3598***	-0.2510***	-0.3607***	-0.2503***
	(0.0059)	(0.0057)	(0.0065)	(0.0061)
Scale	0.9484***	0.9525***	0.9523***	0.9534***
	(0.0064)	(0.0058)	(0.0067)	(0.0062)
SOEShare	0.0201	0.0082	0.0128	-0.0013
	(0.0159)	(0.0157)	(0.0209)	(0.0210)
_cons	-1.9170***	2.6618***	-1.9573***	2.5369***
	(0.5815)	(0.3010)	(0.6167)	(0.3444)
Year_FE	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	163807	163807	119686	119686
r2_a	.77648477	.778948	.7715225	.77553322

Notes: This table is a PSM-DID regression for the main regression. *T_Treat1* and *T_Treat2* are the interactions between the time variable T and the matched variables for $Treat1_f$ and $Treat2_f$. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 9: Subsample Regressions: excluding Year 2002

	(1) TFPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP	(5) TFPOP	(6) TFPLP
T_Treat1	0.0098	0.0076				
	(0.0081)	(0.0071)				
T_ExportShare			0.0004***	0.0003***		
			(0.0001)	(0.0001)		
T_treat2					0.0183**	0.0129
					(0.0091)	(0.0083)
HHI	2.2158	-6.3645***	2.2361	-6.3525***	1.8473	-6.3539***
	(2.2860)	(1.9890)	(2.2854)	(1.9896)	(2.4707)	(2.1042)
IndustrySale	-0.2954***	-0.3139***	-0.2972***	-0.3154***	-0.2995***	-0.3114***
	(0.0543)	(0.0256)	(0.0542)	(0.0255)	(0.0551)	(0.0260)
IndustryExport	0.3630***	0.1428***	0.3658***	0.1450***	0.3690***	0.1457***
	(0.0662)	(0.0303)	(0.0662)	(0.0301)	(0.0674)	(0.0309)
SOEShare	-0.0074	-0.0074	-0.0078	-0.0077	-0.0113	-0.0144
	(0.0194)	(0.0193)	(0.0193)	(0.0192)	(0.0224)	(0.0223)
Scale	0.9523***	0.9558***	0.9522***	0.9557***	0.9558***	0.9574***
	(0.0068)	(0.0064)	(0.0068)	(0.0064)	(0.0069)	(0.0065)
KL	-0.3677***	-0.2573***	-0.3677***	-0.2573***	-0.3660***	-0.2553***
	(0.0067)	(0.0062)	(0.0067)	(0.0062)	(0.0069)	(0.0063)
Human	-0.9294***	-0.3732***	-0.9286***	-0.3724***	-0.9278***	-0.3707***
	(0.0122)	(0.0085)	(0.0121)	(0.0085)	(0.0122)	(0.0088)
_cons	-1.8538**	2.6644***	-1.8709***	2.6508***	-1.9462***	2.5253***
	(0.7119)	(0.3993)	(0.7120)	(0.3985)	(0.7231)	(0.4120)
Year_FE	YES	YES	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	147226	147226	146656	146656	118949	118949
r2_a	.79063257	.79039208	.7906761	.79043256	.78495414	.78571814

Notes: This table is about a sub-sample regression for the main regression. The sub-sample excludes observations in year 2002 to avoid the potential influence of tariff reduction caused by China's accession to WTO. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by firm. Significant at ***1%, **5%, *10%.

Table 10: Subsample Regressions: Excluding Single-Product Firms

	(1) TFPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP	(5) TFPOP	(6) TFPLP
T_Treat1	0.0343***	0.0242***				
	(0.0093)	(0.0074)				
T_ExportShare			0.0004***	0.0003***		
			(0.0001)	(0.0001)		
T_Treat2					0.0418***	0.0295***
					(0.0101)	(0.0085)
HHI	2.3108	-4.9056***	2.3127	-4.8943***	2.0189	-5.3609***
	(1.9225)	(1.4406)	(1.9298)	(1.4428)	(1.9814)	(1.5425)
IndustrySale	-0.2856***	-0.3074***	-0.2852***	-0.3075***	-0.3024***	-0.3161***
	(0.0443)	(0.0217)	(0.0444)	(0.0218)	(0.0455)	(0.0223)
IndustryExport	0.3669***	0.1347***	0.3668***	0.1351***	0.3746***	0.1451***
	(0.0540)	(0.0246)	(0.0541)	(0.0246)	(0.0556)	(0.0258)
Human	-0.9081***	-0.3528***	-0.9073***	-0.3520***	-0.9138***	-0.3569***
	(0.0117)	(0.0090)	(0.0116)	(0.0090)	(0.0119)	(0.0090)
KL	-0.3598***	-0.2482***	-0.3598***	-0.2482***	-0.3621***	-0.2499***
	(0.0065)	(0.0059)	(0.0065)	(0.0059)	(0.0069)	(0.0061)
Scale	0.9462***	0.9500***	0.9458***	0.9496***	0.9521***	0.9538***
	(0.0068)	(0.0062)	(0.0068)	(0.0062)	(0.0067)	(0.0062)
SOEShare	0.0149	0.0066	0.0153	0.0070	0.0128	-0.0024
	(0.0208)	(0.0208)	(0.0207)	(0.0207)	(0.0228)	(0.0232)
_cons	-2.1563***	2.5683***	-2.1549***	2.5643***	-1.9969***	2.5467***
	(0.6161)	(0.3213)	(0.6156)	(0.3196)	(0.6364)	(0.3352)
Year_FE	YES	YES	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	122335	122335	121679	121679	104021	104021
r2_a	.76698352	.7758821	.76705377	.77594265	.7678999	.77506982

Notes: This table is about a sub-sample regression for the main regression. The subs-ample excludes all single-product exporters in order to strengthen our channel analysis. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 11: Placebo Regressions

	(1) TfPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP
T1_Treat1	0.0146*	0.0076		
	(0.0076)	(0.0067)		
T2_Treat1			0.0128	0.0051
			(0.0101)	(0.0087)
HHI	2.6567	-5.8489***	2.6549	-5.8503***
	(1.7644)	(1.4215)	(1.7652)	(1.4214)
IndustrySale	-0.3026***	-0.3149***	-0.3022***	-0.3147***
	(0.0421)	(0.0208)	(0.0421)	(0.0208)
IndustryExport	0.3727***	0.1367***	0.3722***	0.1363***
	(0.0520)	(0.0238)	(0.0521)	(0.0238)
Human	-0.9088***	-0.3552***	-0.9089***	-0.3553***
	(0.0112)	(0.0082)	(0.0112)	(0.0083)
KL	-0.3615***	-0.2525***	-0.3616***	-0.2526***
	(0.0060)	(0.0056)	(0.0060)	(0.0056)
Scale	0.9507***	0.9550***	0.9506***	0.9549***
	(0.0064)	(0.0059)	(0.0064)	(0.0058)
SOEShare	0.0249	0.0145	0.0250	0.0146
	(0.0163)	(0.0161)	(0.0163)	(0.0161)
_cons	-1.9543***	2.6671***	-1.9489***	2.6709***
	(0.5781)	(0.3009)	(0.5780)	(0.3002)
Year_FE	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES
Cluster	Industry_Year	Industry_Year	Industry_Year	Industry_Year
N	171588	171588	171588	171588
r2_a	.77382881	.77735801	.77382304	.77735569

Notes: This table is about a placebo test regression. The treat years are set on 2006 and 2007. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 12: IV Regressions

	(1) T_Treat1	(2) T_ExportShare	(3) T_Treat2	(4) tfpop	(5) tfpop	(6) tfpop
T_distance	-0.0001***	-0.0042***	-0.0001***			
	(0.000)	(0.001)	(0.000)			
T_Treat1				1.0042***		
				(0.271)		
T_ExportShare					0.0127***	
					(0.004)	
T_Treat2						0.5651***
						(0.146)
HHI	0.0516	-48.9499	-0.2102	2.6900	3.3609*	2.3943
	(0.512)	(45.230)	(0.645)	(1.743)	(1.860)	(1.843)
IndustrySale	0.0673***	5.9969***	0.0795***	-0.3656***	-0.3756***	-0.3431***
	(0.014)	(1.207)	(0.017)	(0.044)	(0.048)	(0.042)
IndustryExport	-0.0779***	-8.4242***	-0.0973***	0.4518***	0.4829***	0.4265***
	(0.014)	(1.322)	(0.017)	(0.055)	(0.063)	(0.053)
Human	-0.0110**	0.7496**	0.0020	-0.8964***	-0.9170***	-0.9119***
	(0.004)	(0.299)	(0.005)	(0.012)	(0.012)	(0.011)
Scale	-0.0201***	-1.4046***	-0.0228***	0.9716***	0.9694***	0.9675***
	(0.004)	(0.248)	(0.004)	(0.009)	(0.009)	(0.007)
KL	-0.0147***	-0.1323	-0.0125***	-0.3457***	-0.3599***	-0.3539***
	(0.003)	(0.181)	(0.003)	(0.008)	(0.006)	(0.007)
SOEShare	0.0268***	3.1897***	0.0391***	-0.0100	-0.0207	-0.0130
	(0.007)	(0.520)	(0.009)	(0.019)	(0.021)	(0.023)
Year_FE						
Individual_FE						
Cluster						
N	169637	168885	123830	167403	166671	122360
r2_a	0.694	0.474	0.627	-0.008	-0.060	0.117

Notes: Our instrument variable *Distance* is the distance from the nearest Chinese main ports (Tianjin, Shanghai, and Hongkong). *T_Distance* is the interaction between the year variable *T* and the instrument variable *Distance*. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.

Table 13: Other Competing Hypothesis

	(1) TFPOP	(2) TFPLP	(3) TFPOP	(4) TFPLP	(5) TFPOP	(6) TFPLP
T_Treat1	0.0346***	0.0197**				
	(0.0100)	(0.0079)				
T_ExportShare			0.0004***	0.0004***		
			(0.0002)	(0.0001)		
T_Treat2					0.0274**	0.0194*
					(0.0117)	(0.0104)
HHI	0.6433	-6.9673**	0.6686	-6.8917**	-0.7950	-8.4775**
	(2.5206)	(3.0822)	(2.5475)	(3.1192)	(3.1208)	(3.7238)
IndustrySale	-0.2682***	-0.3292***	-0.2687***	-0.3311***	-0.2889***	-0.3353***
	(0.0622)	(0.0373)	(0.0618)	(0.0367)	(0.0610)	(0.0354)
IndustryExport	0.2504***	0.1385***	0.2496***	0.1398***	0.2735***	0.1524***
	(0.0669)	(0.0480)	(0.0673)	(0.0474)	(0.0722)	(0.0459)
Human	0.2414***	0.1344***	0.2408***	0.1341***	0.2484***	0.1397***
	(0.0087)	(0.0075)	(0.0088)	(0.0075)	(0.0094)	(0.0087)
KL	-0.1085***	-0.1570***	-0.1086***	-0.1570***	-0.1154***	-0.1586***
	(0.0100)	(0.0062)	(0.0101)	(0.0062)	(0.0111)	(0.0069)
Scale	0.6747***	0.8382***	0.6740***	0.8379***	0.6674***	0.8326***
	(0.0115)	(0.0078)	(0.0116)	(0.0079)	(0.0126)	(0.0089)
SOEShare	-0.0266	-0.0037	-0.0283	-0.0041	-0.0343	-0.0161
	(0.0258)	(0.0239)	(0.0257)	(0.0240)	(0.0331)	(0.0291)
Import	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
_cons	-4.0038***	1.5874***	-3.9590***	1.6052***	-3.8021***	1.5863***
	(0.7769)	(0.4563)	(0.7723)	(0.4502)	(0.8411)	(0.4981)
Kleibergen-Paap rk LM statistic				33.460	24.361	60.017
Cragg-Donald Wald F statistic				152.397	115.984	381.346
Hansen J Statistic				0.000	0.000	0.000
Year_FE	YES	YES	YES	YES	YES	YES
Individual_FE	YES	YES	YES	YES	YES	YES
Cluster	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year	Ind_Year
observations	132372	132372	131517	131517	99098	99098
R^2	.770	.807	.770	.807	.761	.801

Notes: This table excludes the effects of another competing potential channel: imported capital goods. *T_Treat1* is the interaction term between the time variable T and the exporter variable $Treat1_f$ which indicates whether firms exported during the pre-reform period. *T_Share* is the interaction term between the time variable T and the average export share variable $Share_f$. *T_Treat2* is the interaction term between the time variable T and the exporter variable $Treat2_f$ which indicates whether firms kept exporting during the entire sample period. *Import* is the firm's import value divided by the firm's operating costs. All regressions include firm fixed effect and year fixed effect. Standard errors in parentheses and clustered by industry and year. Significant at ***1%, **5%, *10%.