# 1 Appendix A: Additional Tables and Figures

Table A1 Output Elasticity of Inputs

| Industry | L | M | K |
| --- | --- | --- | --- |
| | (1) | (2) | (3) |
| Agricultural and food products,beverages | 0.020 | 0.939 | 0.008 |
| Manufacture of tobacco | 0.502 | 0.539 | 0.027 |
| Textiles, apparel | 0.167 | 0.711 | 0.028 |
| Timber, manufacture of wood, bamboo, rattan, palm, and straw products | 0.037 | 0.870 | 0.088 |
| Furniture | 0.185 | 0.548 | 0.044 |
| Paper and paper products, printing, articles for culture, education and sport | 0.118 | 0.787 | 0.030 |
| Petroleum, coking, and processing of nuclear fuel | 0.027 | 0.819 | 0.216 |
| Raw chemical materials and chemical products | 0.172 | 0.675 | 0.128 |
| Manufacture of medicines | 0.090 | 0.836 | 0.025 |
| Chemical fibers | 0.267 | 0.124 | 0.248 |
| Rubber | 0.036 | 0.677 | 0.061 |
| Plastics | 0.232 | 0.653 | 0.040 |
| Non-Metallic mineral products | 0.112 | 0.767 | 0.049 |
| Smelting and pressing of ferrous metals | 0.075 | 0.859 | 0.036 |

Table A1 Output Elasticity of Inputs (continued)

| Industry | L | M | K |
| --- | --- | --- | --- |
| | (1) | (2) | (3) |
| Smelting and pressing of non-ferrous metals | 0.093 | 0.878 | 0.019 |
| Metal products | 0.082 | 0.921 | 0.006 |
| General purpose and special prupose machinery, transport equipment | 0.151 | 0.886 | -0.022 |
| Electrical machinery and equipment | 0.293 | 0.784 | 0.053 |
| Communication equipment, computers, and other electronic equipment | 0.085 | 0.870 | 0.043 |
| Measuring instruments and machinery for cultural activities and office work | 0.204 | 0.696 | 0.013 |
| Artwork and other manufacturing | 0.156 | 0.736 | 0.039 |

Table A2. Productivity Comparison fo Firms That: Trade v.s. Do Not Trade

| TFPQ | $RC < \overline{RC}$ | | $RC \geq \overline{RC}$ | |
| --- | --- | --- | --- | --- |
| | Trade | Not Trade | Trade | Not Trade |
| | (1) | (2) | (3) | (4) |
| mean | 1.679 | 1.580 | 1.700 | 1.595 |
| p25 | 1.440 | 1.311 | 1.481 | 1.325 |
| p50 | 1.824 | 1.611 | 1.852 | 1.601 |
| p75 | 1.960 | 1.911 | 1.998 | 1.930 |
| Observations | 621 | 13233 | 535 | 4377 |

Table A3. Dynamic Effects on Trade Participation

| | 2000 | 2002 | 2003 | 2004 | 2005 | 2006 |
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Causal Effect | 0.005 | 0.144*** | 0.212*** | 0.307*** | 0.298*** | 0.248*** |
| | (0.062) | (0.026) | (0.032) | (0.040) | (0.045) | (0.044) |
| Y_ct | 0.068 | 0.074 | 0.107 | 0.141 | 0.157 | 0.172 |
| Observations | 15923 | 19091 | 15868 | 11593 | 10839 | 9934 |

Significance: *.10; **.05; ***.01.

*Notes:* Table A3 reports the dynamic effects on trade participation. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Standard errors are computed via bootstrap.

Table A4. Estimates of Causal Effects on Total Assets, Debt and Equity

| | Total Assets | Total Debt | Equity |
|---|---|---|---|
| | (1) | (2) | (3) |
| Causal Effect | -1260.322 | -1841.956 | 581.637 |
| | (2186.750) | (1794.234) | (897.668) |
| Y_ct | 15113 | 10684.950 | 4428.052 |
| Observations | 19091 | 19091 | 19091 |

Significance: *.10; **.05; ***.01.

*Notes:* Column (1)-(3) report the impacts on total assets, debt and equity. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Unit: 1,000. Standard errors are computed via bootstrap.

Table A5. Estimates of Causal Effects on Components of Total Assets and Total Debt

A: Components of Total Debt

|  | Short-term Debt | Long-term Debt |
|---|---|---|
|  | (1) | (2) |
| Causal Effect | -754.932 | -1332.327* |
|  | (1562.494) | (682.982) |
| Y_ct | 9146.581 | 1425.282 |
| Observations | 19091 | 19091 |

B: Components of Total Assets

|  | Current Assets | Fixed Assets | Long-run Investment | Intangible Assets |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| Causal Effect | -275.748 | -605.225 | 29.978 | -395.890* |
|  | (1141.609) | (940.875) | (159.657) | (215.425) |
| Y_ct | 8159.325 | 5259.824 | 227.754 | 468.244 |
| Observations | 19091 | 19091 | 19091 | 19091 |

C: Components of Current Assets

|  | Inventory | Rceivables (Net Accounts) | Other Current Assets |
|---|---|---|---|
|  | (1) | (2) | (3) |
| Causal Effect | -71.071 | 205.114 | -409.791 |
|  | (543.876) | (376.350) | (706.344) |
| Y_ct | 2732.654 | 2285.865 | 3140.806 |
| Observations | 19091 | 19091 | 19091 |

Significance: *.10; **.05; ***.01.

6

*Notes:* Please refer to the next page.

*Notes:* Panel A reports the impacts on short-term and long-term debts. Panel B reports the impacts on different components of assets. We further decompose current assets into inventory, receivables and other current assets and report the corresponding impacts in pancel C. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Unit: 1,000. Standard errors are computed via bootstrap.
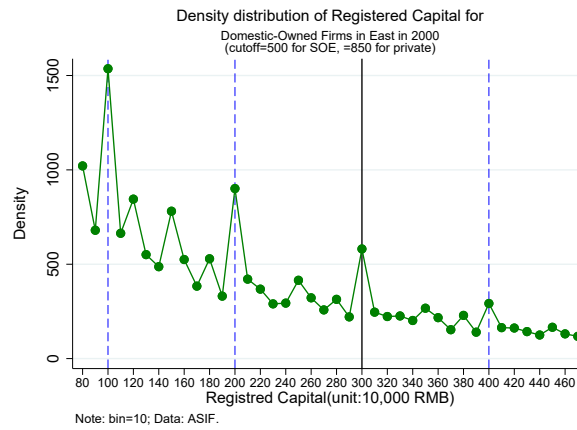
Table A6 Change in Outcomes for Firms above excluded region: $2002 - 2000$

| | Productivity | Trade Participation | Productivity Gains from Trade |
|---|---|---|---|
| | (1) | (2) | (3) |
| Causal Effect | 0.024*** | 0.022*** | 1.104** |
| | (0.006) | (0.008) | (0.508) |
| Observations | 3178 | 3178 | 3178 |

Significance: *.10; **.05; ***.01.

*Notes:* Firms with registered capital above 300 prior to the policy change were granted trading rights in 2002 without the need to adjust their registered capital. Changes in productivity for these firms are likely to be induced by the policy change, rather than by firms' increasing their registered capital to the cutoff. Coulmn (1) and (2) report changes in productivity and trade participation for these firms, after controlling for sector fixed effects. Column (3) reports the average treatment effect of trade on productivity for these firms.
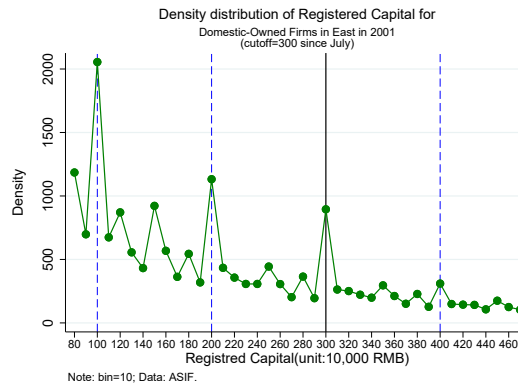
### a. Placebo: DE East in 2000



Density distribution of Registered Capital for
Domestic-Owned Firms in East in 2000
(cutoff=500 for SOE, =850 for private)

Note: bin=10; Data: ASIF.

### b. Transition: DE East in 2001



Density distribution of Registered Capital for
Domestic-Owned Firms in East in 2001
(cutoff=300 since July)

Note: bin=10; Data: ASIF.

Figure A1 Density Distribution of Registered Capital at Threshold 300 for DOE East in 2000 and 2001

*Note:* The minimum requirement on registered capital for obtaining trading rights was 500 (unit: 10,000 RMB, hereafter) for SOE and 850 for PIE together with other requirements in 2000. The requirement was reduced to 300 since July 2001. Compared to Figure 3 and Figure A1a, we find that bunching at 300 in 2001 (as shown in with Figure A1b) is higher than that in 2000, but is lower than that in 2002. Given that firms had only half a year in 2001 to respond to the policy, these findings further suggest that firms indeed adjust their registered capital to the threshold to be qualified for trading rights.
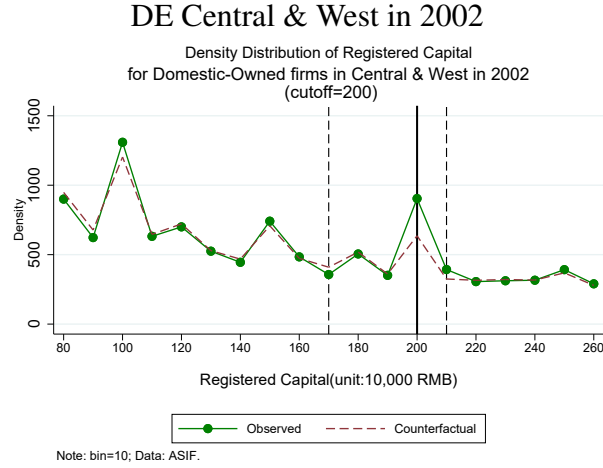
**DE Central & West in 2002**

Figure A2 Density Distribution of Registered Capital at Threshold 200 for Domestic-Owned Firms in Central & West in 2002

*Notes:* We construct the counterfactual distribution in spirit of difference in differences. Specifically, using 2000 as the pretreatment period, we conduct the following regression: $h_{jt} = \lambda_j + Post_t + \sum_{rc_j \geq rc_{lb}}^{rc_j \leq rc_{ub}} \beta_j * Post_t * Treat_j + \varepsilon_{jt}$, where $Post_t = 1$ if $t = 2002$, $Post_t = 0$ if $t = 2000$; $[rc_{lb}, rc_{ub}]$ denotes the excluded region. Counterfactual density distribution in 2002 is then calculated as $\hat{h}_{jt}^0 = \hat{\lambda}_j + \hat{Post}_t$. After controlling for rounding, there is extra bunching at the threshold 200 for domestic-owned firms in Central and West in 2002. This indicates that firms respond to the trading rights policy.
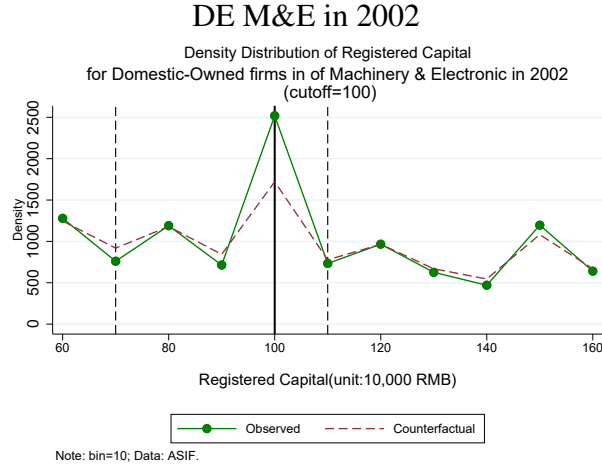
**DE M&E in 2002**

Density Distribution of Registered Capital
for Domestic-Owned firms in of Machinery & Electronic in 2002
(cutoff=100)

Figure A3 Density Distribution of Registered Capital at Threshold 100 for Domestic-Owned Firms

for Mechanical & Electronic Sector in 2002

*Notes:* We construct the counterfactual distribution in spirit of difference in differences. Specifi-

cally, using 2000 as the pretreament period, we conduct the following regression: $h_{jt} = \lambda_j + Post_t +$

$\sum_{rc_j \geq rc_{lb}}^{rc_j \leq rc_{ub}} \beta_j * Post_t * Treat_j + \varepsilon_{jt}$, where $Post_t = 1$ if $t = 2002$, $Post_t = 0$ if $t = 2000$; $[rc_{lb}, rc_{ub}]$

denotes the excluded region. Counterfactual density distribution in 2002 is then calculated as

$\hat{h}_{jt}^0 = \hat{\lambda}_j + \hat{Post}_t$. After controlling for rounding, there is extra bunching at the threshold 100 for

domestic-owned firms in M&E sector in 2002. This indicates that firms respond to the trading

rights policy.
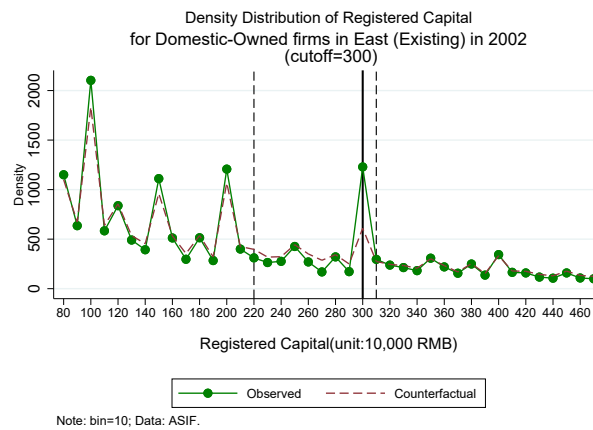
DE East in 2002 (Excluding New Entries)

Density Distribution of Registered Capital
for Domestic-Owned firms in East (Existing) in 2002
(cutoff=300)

Note: bin=10; Data: ASIF.

Figure A4 Density Distribution of Registered Capital at Threshold 300 for Existing Domestic-Owned Firms in East in 2002

*Notes:* To alleviate the concerns about firm entries, we draw the density distribution for our focal sample in 2002 while excluding new entries between 2001 and 2002. We then compare it to the estimated counterfactual density using the nonparametric approach. We find a significant jump at the policy threshold 300. These results suggest that new entries may not introduce significant bias into our analyses.
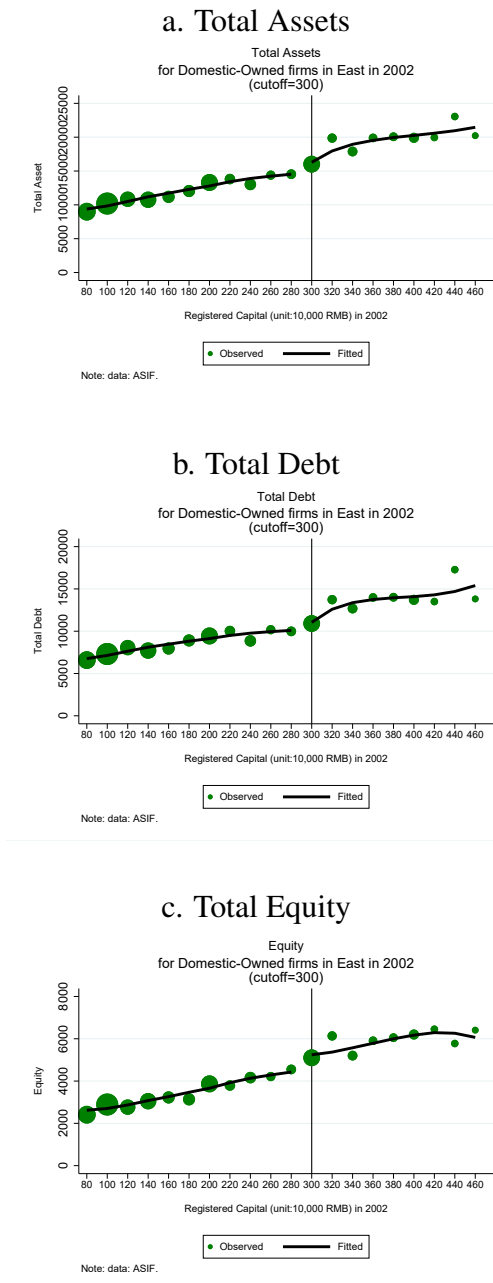
12

## a. Total Assets



Total Assets
for Domestic-Owned firms in East in 2002
(cutoff=300)

Note: data: ASIF.

## b. Total Debt



Total Debt
for Domestic-Owned firms in East in 2002
(cutoff=300)

Note: data: ASIF.

## c. Total Equity



Equity
for Domestic-Owned firms in East in 2002
(cutoff=300)

Note: data: ASIF.

Figure A5 Distribution of Total Assets, Total Debt and Equity

*Notes:* In figure A5a, the green dots denote the mean value of total assets for each bin. Following

Chen et al. (2021), we report the data along with an estimated cubic regression of total assets on

registered capital with heterogeneous coefficients above and below the notch. We conduct similar

exercise for total debt and equity in Figures A5b and A5c respectively. There is no visually evident

increase in total assets, total debt or equity when registered capital passes the policy threshold.

13

# 2    Appendix B: Additional Robustness Checks

In this appendix, we provide a series our robustness checks on our main results, including additional checks of excluded region and polynomial order, excluding processing traders, and alternative definition of trade participation.

*Checks of excluded region and polynomial order.* In the main analysis, excluded region $[rc_{lb}, rc_{ub}]$ and the polynomial order are chosen based on the following criteria: (i) to minimize the out-of-sample mean-squared error based on cross validation and (ii) ensure that the excess bunching equals the missing mass ($B = M$). As a robustness check, we estimate causal effects based on alternative excluded region and polynomial order selections with the second or third lowest mean-squared error and also satisfying $B = M$. As shown in Table B1, the results remain similar.

*Excluding processing traders.* An important feature of China's international trade is that a significant portion occurs through processing trading, i.e., firms import duty-free their intermediate inputs and export the final goods after local processing or assembly. However, processing traders are governed by the same international trade regulations as those of their ordinary counterparts (i.e., based on the need for trading rights for international trade and the same thresholds of registered capital). Hence, in the aforementioned analyses, we include both ordinary and processing firms. Nonetheless, to address the concern that processing firms may behave differently (due to their special trade arrangements) and drive our results, we conduct a robustness check that excludes firms engaging in processing trade. The results are presented in Table B2. Our estimates remain similar, suggesting that our findings are general and not driven by special arrangements of processing trade.

*Alternative definition of trade participation.* In the main analysis, trade participation is de-

fined as whether firms have positive values of exports or imports in the customs data. The measure of direct trade participation is consistent with the trading rights policy. However, when merging the two data sets, we might lose firms whose name do not appear in the customs data. As a robustness check, we define trade participation based on whether firms have positive export value in the ASIF data. The compromise of this definition is that it may include both direct and indirect exporters (i.e., firms exporting through trade intermediaries). As shown in Table B3, estimation results remain similar, suggesting that the sample attrition does not significantly bias our estimates.

To further address the concern that indirect exporters may behave differently from ordinary direct exporters and hence bias our estimation and interpretation of the policy effect, we conduct a robustness check by excluding indirect exporters. Specifically, indirect exporters are defined as firms with positive export value in the ASIF data (covering both direct and indirect exports) but no export transactions in the customs data (covering only direct exports). The estimation results remain similar as shown in Table B4.

Table B1 Estimates based on Alternative excluded region and Polynomial Orders

| | Trade Participation | Productivity | Productivity to Trade |
|---|---|---|---|
| | (1) | (2) | (3) |
| Robustness: excluded region [220, 320], order 5 | | | |
| Causal Effect | 0.144*** | 0.098*** | 0.686*** |
| | (0.022) | (0.019) | (0.198) |
| Y_ct | 0.074 | 1.556 | |
| Observations | 19091 | 18510 | 18510 |
| Robustness: excluded region [230, 300], order 5 | | | |
| Causal Effect | 0.148*** | 0.102*** | 0.691*** |
| | (0.024) | (0.019) | (0.198) |
| Y_ct | 0.071 | 1.558 | |
| Observations | 19091 | 18510 | 18510 |

Significance: *.10; **.05; ***.01.

*Notes:* Table B1 reports estimates based on alternative excluded region and polynomial orders as a robustness check. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Standard errors are computed via bootstrap.

Table B2 Estimates of Causal Effects by Excluding Processing Firms

|  | Trade Participation | Productivity | Productivity to Trade |
|---|---|---|---|
|  | (1) | (2) | (3) |
| Causal Effect | 0.145*** | 0.097*** | 0.671*** |
|  | (0.020) | (0.020) | (0.180) |
| Y_ct | 0.052 | 1.553 |  |
| Observations | 18776 | 18196 | 18196 |

Significance: *.10; **.05; ***.01.

*Notes:* Table B2 reports the estimates using the sample without processing firms as a robustness check. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Standard errors are computed via bootstrap.

Table B3 Estimates of Causal Effects on Trade Participation

| | Trade Participation By ASIF Data |
|---|---|
| Trade Participation | 0.092** |
| | (0.045) |
| Y_ct | 0.256 |
| Observations | 19091 |

Significance: *.10; **.05; ***.01.

*Notes:* Table B3 reports trade effect, where trade participation is defined based on whether firms have positive export value in the ASIF data. The compromise of this definition is that it may include both direct and indirect exporters (i.e., firms exporting through trade intermediaries). The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. The unit is 1. Standard errors are computed via bootstrap.

Table B4 Estimates of Causal Effects by Excluding Indirect-Exporting Firms

| | Trade Participation | Productivity | Productivity to Trade |
|---|---|---|---|
| | (1) | (2) | (3) |
| Causal Effect | 0.195*** | 0.102*** | 0.522*** |
| | (0.031) | (0.025) | (0.159) |
| Y_ct | 0.091 | 1.541 | |
| Observations | 15331 | 14802 | 14802 |

Significance: *.10; **.05; ***.01.

*Notes:* Table B4 reports the estimates using the sample without indirect exporters as a robustness check. The causal estimator is defined in equation 3 on page 23, in which it uses equations 1 and 2 laid out on pages 21-22 and the calculation procedures on page 23. See Section 4 for details on the estimation. Standard errors are computed via bootstrap.