Exporting and Frictions in Input Markets: Evidence from Chinese Data

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January 4, 2019

Atlanta, AEA 2019

The views presented in this paper represent those of the authors and do not necessarily coincide with those of the Federal Reserve System.
Motivation

- Large dispersion across average products of labor and capital within industries, possibly caused by frictions.

- Removing those frictions in input markets generates large TFP gains.
  - Hsieh and Klenow (2009): removing all sources of misallocations would increase total factor productivity (TFP) in China by 86-115 percent.
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- This paper: Shocks to export opportunities can alleviate misallocation, thus raising aggregate TFP.
Roadmap

1. Empirical Evidence

2. Framework
   - Borrowing constraints tied to past performance.
   - Exporting à la Helpman et al. (2010)

3. Empirical Analysis
   - The deviation of average products from the frictionless equilibrium tends to be smaller at firms facing a shock to market access.
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Data

- China’s Annual Survey of Industry (AIS)
  - Balance sheet information, e.g., revenue, assets, investments, employments, etc.
  - Data on all state-owned firms and on non-state-owned firms with revenues above five million RMB ($700K)
  - Years: 1998-2007
  - Construct a real capital stock series from investments as in Brandt et al. (2012); moreover, we use their deflators for gross output, input and capital investments.

- Firm Export Customs (2000-2007)
  - Firm-level exports by country, product, and year.
Firm-level measures of dispersion

- Hsieh and Klenow (2004): frictions in capital and output markets induce within-sector variation in the average products of labor and capital across firms.

- Our firm-level measures: the deviation of firm-level outcomes from sector averages.

\[ \ln \lambda_{i,t} = \left| \frac{\ln P_{i,t}}{P_{st}} \right| = \left| \ln \left[ 1 + \left( 1 + \mu_{i,s,t} \right) \int_{i \in I} \left( 1 + \mu_{i,s,t} \right) di \right] \right| \]
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Constructing the measures

- Normalize the average products by the sector averages.
- Express the normalized measures in log-s.
- Take absolute value.

For labor return, for example,

\[
|\ln \lambda_{ist}| = \left| \ln \frac{P_{ist}Y_{ist}}{L_{ist}} \right| = \left| \ln \left[ \frac{1}{(1 + \mu_{is,t+1})} \int_{i \in I} (1 + \mu_{is,t+1}) \, di \right] \right|
\]
Looking at Firm-level Measures

Positive and negative deviations of individual returns from zero reveal the presence of heterogeneous wedges affecting input choices. For labor, e.g.,

- Firms with $\ln \lambda > 0$ have labor returns above the sector average, i.e. their labor input demand is below the sector’s.
- Firms with $\ln \lambda < 0$ have labor returns below the sector average, i.e. their labor input demand is above the sector’s.
Controlling for Firm Heterogeneity

Firm heterogeneity affects the dispersion across average products of labor and capital.

Construct a residual average product: control for the effect of profit margin (proxy for demand elasticity), size, TFP, and sector-time dummies.

\[
\ln \lambda \quad \text{Distribution of Labor Returns}
\]
\[
\ln \kappa \quad \text{Distribution of Capital Returns}
\]
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Distribution of Labor Returns ($\ln \lambda$)  Distribution of Capital Returns ($\ln \kappa$)
Dispersions across L and K over time

Within-sector dispersion across input returns declined over 1998-2007

Source: AIS Data, 1998-2007.
Notes: the average output distortion is obtained from a regression of residual labor returns on time dummies; the estimates are relative to 1998. Red-shaded area denotes 95 percent confidence interval.

Source: AIS Data, 1998-2007.
Notes: the average capital distortion is obtained from a regression of residual capital returns on time dummies; the estimates are relative to 1998. Blue-shaded area denotes 95 percent confidence interval.
Dispersion across Input Returns: Exporters vs. Nonexporters

Cross-sectional comparison

\[ \text{Disp} \left( \ln y \right)_{jast} = \alpha_0 + \alpha_1 \text{Export}_{jast} + D_{as} + D_t + \eta_{iast}, \quad y = \lambda, \kappa \]

where \( \text{Export}_{jast} = 1 \) indicates that the dispersion is computed across exporting firms of age \( a \) in sector \( s \) at time \( t \).

Additional controls

- Dispersion across profit margin
- Dispersion across size
- Dispersion across TFP

Remove export status-sector-age-time cells with less than 10 firms.
Within-sector-age dispersion is smaller across exporters.

| Variables | (1) Avg $|ln\lambda|$ | (2) Avg $|ln\lambda|$ | (3) Avg $|ln\kappa|$ | (4) Avg $|ln\kappa|$ | (5) Avg $|ln\kappa|$ | (6) Avg $|ln\kappa|$ |
|-----------|------------|------------|------------|------------|------------|------------|
| Export    | -0.047***  | -0.045***  | -0.039***  | -0.112***  | -0.110***  | -0.102***  |
| sd ln $\psi$ | 0.033*** | 0.031*** | 0.027*** | 0.025*** |
| sd TFP    | 0.188***   | 0.188***   | 0.232***   | 0.232***   |
| sd K      | -0.021***  | -0.021***  | -0.041***  | -0.041***  |
| sd Empl   |            |            |            |            |

Sector$^a$-Age  y  y  y  y  y  y  y  y

Year  y  y  y  y  y  y

Obs.  47,526  47,526  47,526  47,526  47,526  47,526  47,526  47,526
R$^2$  0.472  0.475  0.509  0.494  0.495  0.523
Roadmap

1. Empirical Evidence

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3. Empirical Analysis
   - The deviation of average products from the frictionless equilibrium tends to be smaller at firms facing a shock to market access.
The Effect of Trade on Misallocation

Focus on borrowing constraints as a source of misallocation.

How trade can reduce misallocation

- Premise: borrowing constraints tied to past revenues.

- Shocks to export opportunities are equivalent to a shock to revenues.

- Larger revenues relax the borrowing constraints, allowing inputs to flow towards more efficient firms.
A Framework of Analysis

Main Elements of the Model (Partial Equilibrium Analysis)

- CES Demand, with elasticity $\sigma$.
- Cobb-Douglas Production.

$$Y_{ist} = z_{ist} L_{ist}^{\alpha_s} K_{ist}^{1-\alpha_s}$$

- Borrowing constraints are linked to size (Gopinath et al. (2015), Arellano et al. (2012); Evidence)

$$K_{ist} \leq A_{is0} + P_{is,t-1} Y_{is,t-1}$$

- Decision to export is modeled as in Helpman et al. (2010)
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- Decision to export is modeled as in Helpman et al. (2010)

Model Implication: Shocks to export opportunities induce input choices closer to the frictionless equilibrium.
Roadmap

1 Empirical Evidence

2 Framework
   ▶ Borrowing constraints tied to past performance.
   ▶ Exporting à la Helpman et al. (2010)

3 Empirical Analysis
   ▶ The deviation of average products from the frictionless equilibrium tends to be smaller at firms facing a shock to market access.
Firm-Level Implications

Shocks to export opportunities induce firm to move closer to optimal equilibrium

With our firm-level measures of distortion

- Under the frictionless equilibrium, $\ln \lambda = 0$ and $\ln \kappa = 0$.
- Therefore, $|\ln \lambda|$ and $|\ln \kappa|$ measure the firm deviation from the frictionless equilibrium.
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- Therefore, $|\ln \lambda|$ and $|\ln \kappa|$ measure the firm deviation from the frictionless equilibrium.

Our Baseline Model

$$|\ln y|_{ist} = \beta_0 + \beta_1 \text{Mkt Access}_{is,t-1} + D_{st} + D_{pt} + D_i + \varepsilon_{ist}$$

Market Access Shocks:

- Export Status
- Export Shipments
- Tariffs above the 75th percentile
Tariffs as Market Access Shocks

Measure of Tariffs

- For exporters: $\tau_{ist} = \sum_j w_{2000} \tau_{ijst}$, where $j$ denotes country/product groups
- For non-exporters: $\tau_{ist} = \tau_{st}$

Weights are export/production shares of total revenues for 2000.

Consider firms facing large vs. small tariffs within a sector

- Firms facing tariffs above 75th percentile vs. below
- Correlation with export status: -0.6
### Table 7: Firm-Level Regressions: Tariffs and Input Market Distortions

| Variables                      | (1)      | (2)      | (3)      | (4)      | (5)      | (6)      |
|-------------------------------|----------|----------|----------|----------|----------|----------|
| Tariffs Above $75_{t-1}$      | 0.007**  | 0.007**  | 0.007**  | 0.010*** | 0.010*** | 0.011*** |
|                               | (0.003)  | (0.003)  | (0.003)  | (0.004)  | (0.004)  | (0.004)  |
| ln Age                        | -0.040***| -0.039***| -0.033***| -0.156***| -0.157***| -0.155***|
|                               | (0.005)  | (0.005)  | (0.005)  | (0.006)  | (0.006)  | (0.006)  |
| ln $\psi$                     | 0.014*** | 0.014*** | 0.055*** | -0.006***| -0.006***| -0.007***|
|                               | (0.001)  | (0.001)  | (0.001)  | (0.001)  | (0.001)  | (0.001)  |
| TFP                           | 0.055*** |          |          |          | 0.259*** |
|                               | (0.003)  |          |          |          | (0.004)  |
| ln $K$                        | -0.033***|          |          |          |          | -0.131***|
|                               | (0.002)  |          |          |          | (0.003)  |
| ln Empl                       |          |          |          |          |          | -0.131***|
|                               |          |          |          |          | (0.003)  |
| Sector-Year                   | y        | y        | y        | y        | y        | y        |
| Prov-Year                     | y        | y        | y        | y        | y        | y        |
| Firm FE                       | y        | y        | y        | y        | y        | y        |
| Obs.                          | 893,613  | 893,613  | 893,613  | 893,613  | 893,613  | 893,613  |
| $R^2$                         | 0.011    | 0.012    | 0.015    | 0.013    | 0.013    | 0.050    |
| Number of Firm IDs            | 297,718  | 297,718  | 297,718  | 297,718  | 297,718  | 297,718  |

- $\ln \lambda$: log return to labor relative to the sector, in absolute value.
- $\ln \kappa$: log return to capital relative to the sector, in absolute value.
- Tariffs Above $75_{t-1}$: dummy equal to one if firm tariff is above 75 percentile within an industry.
- $\ln \psi$: profit margin.
- TFP: total factor productivity, Wooldrige (2009) extension to Levinshon-Petrin methodology.
- $\ln K$: log capital.
- $\ln \text{Empl}$: log employment.

Notes:
- FE firm-level regressions, 2001-2007. Firm-level tariffs are constructed using export shares from 2000; non-exporters are assigned their industry tariffs. Standard errors are clustered at the firm level.

Legend:
- **: significant at 1%,
- ***: at 5%,
- *: at 10%.
Distortions and Borrowing Constraints

- Interaction between sector-level average debt-to-asset ratio and market access shocks
  - Firms facing tariffs above the 75th percentile and in sectors with higher debt-to-asset ratio experience even higher capital distortions.

| Variables                        | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|-----|-----|-----|-----|-----|-----|
| Tariffs Above $75_{t-1}$         | 0.079* | 0.077* | 0.077* | -0.153*** | -0.152*** | -0.152*** |
|                                 | (0.044) | (0.044) | (0.044) | (0.051) | (0.051) | (0.051) |
| Tariffs Above $75_{t-1}$*Lev. Ratio | -0.121 | -0.118 | -0.118 | 0.275*** | 0.274*** | 0.275*** |
|                                 | (0.074) | (0.074) | (0.074) | (0.086) | (0.086) | (0.086) |
| ln Age                          | -0.041*** | -0.040*** | -0.034*** | -0.156*** | -0.156*** | -0.155*** |
|                                 | (0.005) | (0.005) | (0.005) | (0.006) | (0.006) | (0.006) |
| ln $\psi$                       | 0.014*** | 0.014*** | 0.014*** | -0.007*** | -0.008*** | -0.008*** |
|                                 | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| TFP                             | 0.055*** | 0.055*** | 0.055*** | 0.261*** | 0.261*** | 0.261*** |
|                                 | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) |
| ln $K$                          | -0.033*** | -0.033*** | -0.033*** |        |        | -0.132*** |
|                                 | (0.002) | (0.002) | (0.002) |        |        | (0.003) |
| ln Empl                         |        |        |        |        |        | -0.132*** |
|                                 |        |        |        |        |        | (0.003) |
| Sector-Year                     | y    | y    | y    | y    | y    | y    |
| Prov-Year                       | y    | y    | y    | y    | y    | y    |
| Firm FE                         | y    | y    | y    | y    | y    | y    |
| Obs.                            | 898,817 | 898,817 | 898,817 | 898,817 | 898,817 | 898,817 |
| $R^2$                           | 0.011 | 0.012 | 0.015 | 0.013 | 0.013 | 0.050 |
| Number of Firm IDs              | 298,746 | 298,746 | 298,746 | 298,746 | 298,746 | 298,746 |
Quantifications and Robustness

Firms facing tariffs above the 75th percentile experience larger distortions in output and input markets

- Facing tariffs above the 75th percentile increases
  - output distortions by 0.7% of a sd.
  - capital distortions by 0.8% of a sd.

- Controlling for proxies of financial constraints reduces the effect on capital distortions by 1/3 (Table).

- the effect on capital distortions is 1.4% of a sd at constrained firms.
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Robustness Checks

- Other market access shocks (Export Status and Export Shipments)

- Private firms vs. SOEs (Table)

- Alternative specification (Petrin & Sivadasan (2013))
Conclusions

- Within-sector input dispersion is significantly lower across exporters.
- Trade shocks induce firms to move closer to the frictionless equilibrium.
  - The effect is significant for both labor and capital measures.
- Back-of-the-envelope calculation: firm-level effects imply that trade shocks increase productivity by 1% by reducing input misallocation. (Effect on TFP)
Larger firms face higher costs of default and, as such, are allowed to borrow more.

| Variables        | (1) Debt/Assets | (2) Debt/Equity | (3) Fee Share | (4) Interest Share |
|------------------|-----------------|-----------------|---------------|--------------------|
| Revenues$_{t-1}$| 0.029*** (0.001)| 0.016*** (0.002)| 0.002*** (0.0004)| 0.002*** (0.0004) |
| Sector-Year      | y               | y               | y             | y                  |
| Prov-Year        | y               | y               | y             | y                  |
| Obs.             | 1,212,190       | 1,212,190       | 1,212,190     | 1,212,190          |
| R$^2$            | 0.062           | 0.056           | 0.002         | 0.002              |
Market Access Shocks and the Effect on Constraints

Let $E = \{E_0, E_1, \ldots, E_T\}$ be the sequence of market size indicators. The $n$-th borrowing constraints satisfies

$$\frac{(1 + \mu_{is,n+1})^\sigma}{[r + \mu_{is,n}]^{(1-\alpha_s)+\alpha_s}} - \frac{\Psi}{\tilde{\theta}_K} \frac{E_{n-1}}{E_n} \frac{(1 + \mu_{is,n})^{\sigma-1}}{[r + \mu_{is,n-1}]^{(1-\alpha_s)(\sigma-1)}} = \frac{A_{is}}{z_{is}} w^{\alpha_s(\sigma-1)}$$

By the Implicit Function Theorem,

$$\frac{\partial \mu_{is,n}}{\partial E_n} > 0$$
$$\frac{\partial \mu_{is,n}}{\partial E_{n-1}} < 0$$
Role of Credit Constraint

Exporters display lower dispersion in sectors with higher financial dependence (Manova (2009))

- Qualitatively similar results with measure of capital intensity or tangibility

| Variables         | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------|-----|-----|-----|-----|-----|-----|
| Export            | -0.076*** | -0.072*** | -0.064*** | -0.169*** | -0.166*** | -0.155*** |
|                   | (0.013)  | (0.013)  | (0.012)  | (0.017)  | (0.017)  | (0.017)  |
| Export*Fin Dep    | -0.070   | -0.061   | -0.040   | -0.546**  | -0.540**  | -0.512**  |
|                   | (0.090)  | (0.094)  | (0.089)  | (0.227)  | (0.221)  | (0.219)  |
| sd ln ψ           | 0.047*** | 0.045*** |          | 0.033***  | 0.030***  |          |
|                   | (0.006)  | (0.006)  |          | (0.006)  | (0.006)  |          |
| sd TFP            | 0.159*** |          |          |          | 0.206***  |          |
|                   | (0.012)  |          |          |          | (0.017)  |          |
| sd K              | -0.016***|          |          |          |          | -0.036**  |
|                   | (0.006)  |          |          |          |          | (0.015)  |
| Sector<a>-Age    | y       | y       | y       | y       | y       | y       |
| Year              | y       | y       | y       | y       | y       | y       |
| Obs.              | 21,590  | 21,590  | 21,590  | 21,590  | 21,590  | 21,590  |
| R²                | 0.323   | 0.329   | 0.359   | 0.338   | 0.340   | 0.369   |

Note: Sector-level regressions, 1998-2007. The unit of observation is an export status-age-sector-year cell; the regression drops cells with less than 10 firms. Standard errors are clustered at the sector level.

Legend: ∗∗∗ significant at 1%, ∗∗ at 5%, ∗ at 10%.
Role of Credit Constraint: Chinese Measure

Exporters display lower dispersion in sectors with higher financial dependence

- Firms classified based on their average debt-to-assets ratio

### Table 4: Financial Dependence, Exporting, and the Dispersion across Input Returns, dropping

cells with less than 10 firms

| Variables                | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                          | Avg $ln\lambda$ |           |           | Avg $ln\kappa$ |           |           |
| Export                   | 0.064     | 0.062     | 0.095     | 0.165     | 0.163     | 0.210*    |
|                          | (0.086)   | (0.085)   | (0.082)   | (0.118)   | (0.118)   | (0.117)   |
| Export*Lev Ratio         | -0.185    | -0.178    | -0.224    | -0.461**  | -0.456**  | -0.520*** |
|                          | (0.147)   | (0.146)   | (0.140)   | (0.198)   | (0.197)   | (0.196)   |
| sd ln $\psi$             | 0.033***  | 0.031***  |           | 0.027***  | 0.025***  |           |
|                          | (0.004)   | (0.004)   |           | (0.005)   | (0.005)   |           |
| sd TFP                   |           |           | 0.188***  |           |           | 0.232***  |
|                          |           |           | (0.007)   |           |           | (0.010)   |
| sd K                     |           |           | -0.020*** |           |           |            |
|                          |           |           | (0.005)   |           |           |            |
| sd Empl                  |           |           |           |            | -0.039*** |            |
|                          |           |           |           |            | (0.010)   |            |
| Sector*-Age              | y         | y         | y         | y         | y         | y         |
| Year                     | y         | y         | y         | y         | y         | y         |
| Obs.                     | 47,526    | 47,526    | 47,526    | 47,526    | 47,526    | 47,526    |
| $R^2$                    | 0.472     | 0.475     | 0.509     | 0.495     | 0.496     | 0.524     |

Legend:
- **∗∗∗** significant at 1%, **∗∗** at 5%, **∗** at 10%

Notes: Sector-level regressions, 1998-2007. The unit of observation is an export status-age-sector-year cell; the regression drops cells with less than 10 firms. Standard errors are clustered at the sector level.

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Exporting and Input Market Frictions  
January 4, 2019
## Tariff Variation across Sectors

Exporters display lower dispersion in sectors with lower tariffs

| Variables | (1) Avg | (2) $|ln\lambda|$ | (3) | | (4) Avg | (5) $|ln\kappa|$ | (6) |
|-----------|--------|--------|------|------|--------|--------|------|
| **Export** | -0.010 | -0.004 | -0.022 | | -0.216*** | -0.212*** | -0.233*** |
| | (0.023) | (0.023) | (0.020) | | (0.030) | (0.030) | (0.028) |
| **W Exp Tariff** | 0.017 | 0.009 | 0.053 | | -0.188 | -0.194 | -0.136 |
| | (0.199) | (0.203) | (0.171) | | (0.290) | (0.293) | (0.248) |
| **Export*W Exp Tariff** | -0.364* | -0.404** | -0.163 | | 1.021*** | 0.992*** | 1.279*** |
| | (0.203) | (0.202) | (0.175) | | (0.294) | (0.293) | (0.265) |
| **sd ln $\psi$** | 0.034*** | 0.032*** | | | 0.025*** | 0.022*** | |
| | (0.004) | (0.004) | | | (0.005) | (0.005) | |
| **sd TFP** | 0.186*** | | | | | 0.235*** | |
| | (0.007) | | | | | (0.010) | |
| **sd K** | -0.021*** | | | | | | |
| | (0.005) | | | | | | |
| **sd Empl** | | | | | -0.034*** | | |
| | | | | | (0.011) | | |

| Sector-age, Year | y | y | y | y | y | y | y |
| Obs. | 45,720 | 45,720 | 45,720 | 45,720 | 45,720 | 45,720 | 45,720 |
| R² | 0.474 | 0.476 | 0.509 | 0.496 | 0.497 | 0.527 |

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*: 4-digit industry codes.

Avg $|ln\lambda|$, Avg $|ln\kappa|$: average within-age-sector absolute deviation between firm labor returns and sectoral allocation.

Avg $|ln\kappa|$: average within-age-sector absolute deviation between firm capital returns and sectoral allocation.

Export: dummy equal to one if the measure of distortion applies to exporters.

W Exp Tariff: average industry tariffs; the measure is weighted by export flows.

sd ln $\psi$: standard deviation across profit margins; the measure is computed with each export status-age-sector-year cell.

sd TFP: standard deviation across productivities; the measure is computed with each export status-age-sector-year cell.

sd K: standard deviation across capital endowments; the measure is computed with each export status-age-sector-year cell.

sd Empl: standard deviation across total employment; the measure is computed with each export status-age-sector-year cell.

Legend: *∗∗∗ significant at 1%, *∗∗ at 5%, *∗ at 10%.

Notes: Sector-level regressions, 1998-2007. The unit of observation is an export status-age-sector-year cell; the regression drops cells with less than 10 firms. Standard errors are clustered at the industry level.
Table B5: Age and the Dispersion across Input Returns, 2007, dropping cells with less than 10 firms

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------|-----|-----|-----|-----|-----|-----|
| Age       | 0.0003 | 0.0003 | -0.0004 | -0.006*** | -0.006*** | -0.006*** |
|           | (0.0004) | (0.0004) | (0.0003) | (0.001) | (0.001) | (0.001) |
| sd ln ψ  | 0.038*** | 0.039*** | (0.009) | (0.009) | 0.052*** | 0.053*** |
|           | (0.009) | (0.009) | (0.010) | (0.010) | (0.010) | (0.010) |
| sd TFP    | 0.148*** | (0.018) | 0.273*** | (0.024) |
| sd K      | -0.025** | (0.011) |
| sd Empl   |              |              | -0.152*** | (0.021) |
| Sector    | y | y | y | y | y | y |
| Year      | y | y | y | y | y | y |
| Obs.      | 5,562 | 5,562 | 5,562 | 5,562 | 5,562 | 5,562 |
| R²        | 0.417 | 0.421 | 0.439 | 0.373 | 0.378 | 0.415 |

* * * significant at 1%, * * at 5%, * at 10%.

Notes: Sector-level regressions, 2007. The unit of observation is a sector-year cell; the regression drops cells with less than 10 firms. Standard errors are clustered at the sector level.
Controlling for Proxies of Financial Constraints

- Effect on output distortions unchanged.
- Effect on capital distortions 1/3 lower.

| Variables                  | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     |
|----------------------------|---------|---------|---------|---------|---------|---------|
| Tariffs Above 75_{t-1}     | 0.006*  | 0.006** | 0.007** | 0.007** | 0.007** | 0.008** |
|                            | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) |
| ln Assets                  | -0.023***| -0.025***| -0.031***| -0.107***| -0.107***| -0.157***|
|                            | (0.002) | (0.002) | (0.003) | (0.003) | (0.003) | (0.003) |
| ln Lev. Ratio              | 0.001   | 0.002   | 0.003   | 0.011***| 0.011***| 0.007***|
|                            | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| ln Age                     | -0.035***| -0.033***| -0.031***| -0.130***| -0.130***| -0.127***|
|                            | (0.005) | (0.005) | (0.005) | (0.006) | (0.006) | (0.006) |
| ln ψ                       | 0.015***| 0.015***| 0.015***| -0.004***| -0.004***| -0.004***|
|                            | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| TFP                        | 0.062** |         |         |         | 0.285***|         |
|                            | (0.003) |         |         |         | (0.004) |         |
| ln K                       | -0.018***|         |         |         |         | -0.087***|
|                            | (0.002) |         |         |         |         | (0.003) |
| ln Empl                    |         |         |         |         |         |         |
| Sector-Year                | y       | y       | y       | y       | y       | y       |
| Prov-Year                  | y       | y       | y       | y       | y       | y       |
| Firm FE                    | y       | y       | y       | y       | y       | y       |
| Obs.                       | 893,613 | 893,613 | 893,613 | 893,613 | 893,613 | 893,613 |
| R²                         | 0.0116  | 0.0125  | 0.0153  | 0.0187  | 0.0187  | 0.0603  |
| Number of Firm IDs         | 297,718 | 297,718 | 297,718 | 297,718 | 297,718 | 297,718 |
## Table 5: Firm-Level Regressions: Exporting and Financial Frictions

| Variables       | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| \( \ln \lambda \) | -0.012*** | -0.012*** | -0.014*** | -0.013*** | -0.013*** | -0.020*** |
| (0.003)         | (0.003)   | (0.003)   | (0.003)   | (0.003)   | (0.003)   | (0.003)   |
| \( \ln \kappa \) | -0.053*** | -0.051*** | -0.042*** | -0.168*** | -0.169*** | -0.154*** |
| (0.004)         | (0.004)   | (0.004)   | (0.006)   | (0.006)   | (0.005)   |           |
| \( \ln \psi \)  | 0.012***  | 0.012***  |           | -0.006*** | -0.008*** |           |
| (0.001)         | (0.001)   |           | (0.001)   |           |           | (0.001)   |
| TFP             | 0.055***  |           |           |           |           | 0.248***  |
| (0.003)         |           |           |           |           |           | (0.004)   |
| \( \ln K \)    |           |           | -0.035*** |           |           |           |
| (0.002)         |           |           | (0.003)   |           |           |           |
| \( \ln \text{Empl} \) |           |           |           |           |          -0.137*** |
| (0.003)         |           |           |           |           | (0.003)   |           |
| Sector-Year     | y         | y         | y         | y         | y         | y         |
| Prov-Year       | y         | y         | y         | y         | y         | y         |
| Firm FE         | y         | y         | y         | y         | y         | y         |
| Obs.            | 1,001,582 | 1,001,582 | 1,001,582 | 1,001,582 | 1,001,582 | 1,001,582 |
| \( R^2 \)       | 0.011     | 0.011     | 0.015     | 0.015     | 0.015     | 0.050     |
| Number of Firm IDs | 309,905   | 309,905   | 309,905   | 309,905   | 309,905   | 309,905   |

- \( \lambda \): log return to labor relative to the sector.
- \( \kappa \): log return to capital relative to the sector.
- \( \psi \): profit margin.
- TFP: total factor productivity, calculated according to the Wooldrige (2009) extension to the Levinshon-Petrin methodology.
- \( K \): log capital.
- \( \text{Empl} \): log employment.

Notes:
- \( \ast \ast \ast \) significant at 1%,
- \( \ast \ast \) at 5%,
- \( \ast \) at 10%.

FE firm-level regressions, 1998-2007. Standard errors are clustered at the firm level.
### Table 6: Firm-Level Regressions: Exporting and Financial Frictions, Intensive Margin

| Variables               | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ln Exports$_{t-1}$     | -0.003*   | -0.003**  | 0.001     | -0.004**  | -0.004**  | -0.014*** |
|                         | (0.001)   | (0.001)   | (0.001)   | (0.002)   | (0.002)   | (0.002)   |
| ln Age                  | -0.053*** | -0.049*** | -0.032*** | -0.245*** | -0.244*** | -0.213*** |
|                         | (0.008)   | (0.008)   | (0.008)   | (0.011)   | (0.011)   | (0.011)   |
| ln $\psi$              | 0.023***  | 0.023***  | 0.005**   | 0.001     |
|                         | (0.002)   | (0.002)   | (0.002)   | (0.002)   |
| TFP                     | -0.015*** | -0.015*** | -0.037*** | 0.192***  |
|                         | (0.004)   | (0.004)   | (0.003)   | (0.007)   |
| ln K                    |           |           |           | -0.126*** |
|                         |           |           |           | (0.005)   |
| ln Empl                 |           |           |           |           |
|                         |           |           |           |           |
| Sector-Year             | y         | y         | y         | y         |
| Prov-Year               | y         | y         | y         | y         |
| Firm FE                 | y         | y         | y         | y         |
| Obs.                    | 307,716   | 307,716   | 307,716   | 307,716   | 307,716   | 307,716   |
| R²                      | 0.012     | 0.014     | 0.015     | 0.022     | 0.022     | 0.042     |
| Number of Firm IDs      | 95,087    | 95,087    | 95,087    | 95,087    | 95,087    | 95,087    |

- ln $\lambda$: log return to labor relative to the sector.
- ln $\kappa$: log return to capital relative to the sector.
- ln Exports$_{t-1}$: value of export shipments for firm $i$ at $t-1$.
- ln $\psi$: profit margin.
- TFP: total factor productivity, calculated according to the Wooldrige (2009) extension to the Levinshon-Petrin methodology.
- ln K: log capital.
- ln Empl: log employment.

Legend: ∗∗∗ significant at 1%, ∗∗ at 5%, ∗ at 10%.

Notes: FE firm-level regressions, 1998-2007. Standard errors are clustered at the firm level.
## Table B7: Firm-Level Regressions: Tariffs, SOE, and Input Market Distortions

| Variables                        | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|-----|-----|-----|-----|-----|-----|
|                                  | ln \( \lambda \) | ln \( \kappa \) | \( \text{SOE} \) | ln \( \psi \) | ln \( \psi \) | ln \( \psi \) |
| SOE                              | -0.040 | 0.033 | 0.111** | 0.021 | 0.130*** | 0.681*** |
|                                  | (0.031) | (0.032) | (0.053) | (0.036) | (0.036) | (0.060) |
| Tariffs Above 75\( t_{t-1} \)   | 0.007** | 0.007** | 0.008** | 0.011*** | 0.011*** | 0.014*** |
|                                  | (0.003) | (0.003) | (0.003) | (0.004) | (0.004) | (0.004) |
| SOE*Tariffs Above 75\( t_{t-1} \) | 0.010 | 0.014 | -0.014 | -0.032 | -0.026 | -0.082*** |
|                                  | (0.018) | (0.018) | (0.018) | (0.020) | (0.020) | (0.021) |
| ln Age                           | -0.042*** | -0.040*** | -0.040*** | -0.155*** | -0.154*** | -0.165*** |
|                                  | (0.005) | (0.005) | (0.005) | (0.006) | (0.006) | (0.006) |
| SOE*ln Age                       | 0.015* | 0.024*** | 0.018** | -0.002 | 0.010 | 0.013 |
|                                  | (0.008) | (0.008) | (0.009) | (0.010) | (0.010) | (0.011) |
| ln \( \psi \)                   | 0.011*** | 0.011*** | -0.011*** | -0.013*** |
|                                  | (0.001) | (0.001) | (0.001) | (0.001) |
| SOE*ln \( \psi \)               | 0.035*** | 0.040*** | 0.053** | 0.064*** |
|                                  | (0.004) | (0.004) | (0.004) | (0.004) |
| TFP                              | 0.065*** | 0.280*** |
|                                  | (0.003) | (0.004) |
| SOE*TFP                          | -0.160*** | -0.280*** |
|                                  | (0.010) | (0.012) |
| ln \( K \)                       | -0.035*** |
|                                  | (0.00) |
| SOE*ln \( K \)                  | 0.048*** |
|                                  | (0.006) |
| ln Empl                          | -0.140*** |
|                                  | (0.003) |
| SOE*ln Empl                      | 0.072*** |
|                                  | (0.009) |

### Notes
- FE firm-level regressions, 2001-2007.
- Firm-level tariffs are constructed using export shares from 2000; non-exporters are assigned their industry tariffs.
- Standard errors are clustered at the firm level.

### Legend
- ****: significant at 1%.
- *****: significant at 5%.
- ****: significant at 10%

### Variables
- ln \( \lambda \): log return to labor relative to the sector, in absolute value.
- ln \( \kappa \): log return to capital relative to the sector, in absolute value.
- \( \text{SOE} \): dummy equal to one for State-owned enterprises.
- Tariffs Above 75\( t_{t-1} \): dummy equal to one if firm tariff is above 75 percentile within an industry.
- ln \( \psi \): profit margin.
- TFP: total factor productivity, Wooldrige (2009) extension to Levinshon-Petrin methodology.
- ln \( K \): log capital.
- ln Empl: log employment.

### Obs.
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817
- 898,817

### R²
- 0.011
- 0.013
- 0.017
- 0.013
- 0.014
- 0.056

### Number of Firm IDs
- 298,746
- 298,746
- 298,746
- 298,746
- 298,746
- 298,746
Alternative Measure of Distortions

- Petrin and Sivadasan (2013) measure resource misallocation at the firm level as the gap between the marginal input product and its marginal cost,

\[ G^j_{ist} = \left| MP^j_{ist} - p_{ist} \right|, \quad j = L, K \]

- Marginal input costs proxied by average costs.

- Positive correlation with our measures:
  - Correlation of 0.25 between \( G^L_{ist} \) and \( |\ln \lambda_{ist}| \).
  - Correlation of 0.46 between \( G^K_{ist} \) and \( |\ln \kappa| \).
## Alternative Measure of Distortions: Results

| Variables                | (1) | (2) $G^L$ | (3) | (4) | (5) $G^K$ | (6) |
|--------------------------|-----|-----------|-----|-----|-----------|-----|
| Tariffs Above $75_{t-1}$ | 0.068 | 0.064 | 0.303*** | 0.034** | 0.034** | 0.057*** |
|                         | (0.121) | (0.121) | (0.114) | (0.016) | (0.016) | (0.014) |
| ln Age                   | 2.287*** | 2.272*** | 0.144 | -0.260*** | -0.261*** | -0.454*** |
|                         | (0.201) | (0.201) | (0.184) | (0.026) | (0.026) | (0.023) |
| ln $\psi$               | -0.286*** | -0.409*** | -0.024*** | -0.024*** | -0.038*** | 2.534*** |
|                         | (0.028) | (0.026) | (0.003) | (0.003) | (0.003) | (0.015) |
| TFP                      | 15.668*** | 15.668*** | 1.223*** | 5.533*** | 5.533*** | 5.533*** |
|                         | (0.109) | (0.109) | (0.084) | (0.121) | (0.121) | (0.121) |
| ln Empl                  | y | y | y | y | y | y |
| Sector-Year              | y | y | y | y | y | y |
| Prov-Year                | y | y | y | y | y | y |
| Firm FE                  | y | y | y | y | y | y |
| Obs.                     | 732,065 | 732,065 | 732,065 | 732,065 | 732,065 | 732,065 |
| R$^2$                    | 0.079 | 0.079 | 0.216 | 0.028 | 0.028 | 0.266 |
| Number of Firm IDs        | 263,592 | 263,592 | 263,592 | 263,592 | 263,592 | 263,592 |

*GL: labor gap. GK: capital gap. Tariffs Above 75$_{t-1}$: dummy equal to one if firm tariff is above 75 percentile within an industry. ln Age: log firm age. ln $\psi$: profit margin. TFP: total factor productivity, calculated according to the Wooldrige (2009) extension to the Levinshon-Petrin methodology. ln K: log capital. ln Empl: log employment. Legend: ∗∗∗: significant at 1%, ∗∗: at 5%, ∗: at 10%. Notes: FE firm-level regressions, 1998-2007. Observations are weighted by the average firm share in value added. Standard errors are clustered at the firm level.
### Table B8: Firm-Level Regressions: Tariffs, SOE, and Input Market Distortions

| Variables | (1)       | (2)       | (3)       | (4)       |
|-----------|-----------|-----------|-----------|-----------|
| Avg $|\ln \kappa|$ | -0.266**  | -0.197*   | -0.393*** |
|          | (0.107)   | (0.101)   | (0.149)   |           |
| Avg $|\ln \lambda|$ | -0.307**  | -0.225    | -0.142    |
|          | (0.148)   | (0.149)   | (0.124)   |           |
| Sd Profit|          |           | -0.129    |           |
|          |           |           | (0.093)   |           |
| Sd K     |          |           | 0.547**   |           |
|          |           |           | (0.245)   |           |
| Sd Empl  |          |           | -0.008    |           |
|          |           |           | (0.212)   |           |
| Year     | y         | y         | y         | y         |
| Industry$^a$ FE | y | y | y | y |
| Obs.     | 4,232     | 4,232     | 4,232     | 4,232     |
| R$^2$    | 0.813     | 0.812     | 0.815     | 0.838     |
| No. of Industries | 425 | 425 | 425 | 425 |

$^a$: 4-digit industry codes. 
Avg TFP: within-industry average productivity. 
Avg $|\ln \lambda|$: average within-sector absolute deviation between firm labor returns and sectoral allocation. 
Avg $|\ln \kappa|$: average within-sector absolute deviation between firm capital returns and sectoral allocation. 
Sd ln $\psi$: within-sector standard deviation across profit margins. 
Sd K: within-sector standard deviation across capital endowments. 
Sd Empl: within-sector standard deviation across total employment. 
Legend: ** significant at 1%, * significant at 5%, * significant at 10%. 
Notes: FE industry regressions, 1998-2007. The unit of observation is a sector-year cell; industries are weighted by their average revenue share. Standard errors are clustered at the sector level.