

Labour Market Monopsony Power and the Dynamic Gains to Openness Reforms

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Roadmap

- 1 Introduction
- 2 Model Environment and Equilibrium
- 3 Calibration
- 4 Results
- 5 Conclusion

Question

- How does monopsony power in labour markets **quantitatively** affect the dynamic gains to tariff and FDI liberalisation episodes.

Motivation

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 - ▶ Naidu, Posner, Weyl (2018): 1–5.
 - ▶ Berger, Herkenhoff & Mongey (2022): 0.76–3.74.
 - ▶ Webber (2015): 1.08.
 - ▶ Yeh, Macaluso & Hershbein (2022): 1.88.

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 - ▶ Yeh, Macaluso & Hershbein (2022): 1.88.
- Melitz (2003) assumes **infinitely elastic** firm-level labour supply.

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 - ▶ CES labour supply aggregator over employers (Berger, Herkenhoff & Mongey, 2022).

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- (iii) Tariff liberalisation and FDI liberalisation exercises.
 - ▶ Both bilateral and unilateral reforms.
 - ▶ Steady state and transition path.

What We Do

- (iv) Shut-down each (and all) feature(s) WMD, LOVE, USLS.
 - ▶ Re-calibrate the model.
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- (v) Run same quantitative exercises and compare.

Results Preview: Welfare Gains (Bilateral Liberalisations)

Labour Market	Tariff	FDI Tax
Imperfect (3 features)	4.7%	1.0%
Perfect (none)	0.9%	0.2%
Difference	3.8%	0.8%

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Difference	3.8%	0.8%
Wage markdowns (WMD)	-0.03%	-1.00%
Love of employer variety (LOVE)	2.10%	4.90%
Upward-sloping labour supply (USLS)	2.00%	-3.10%

Qualitative Channels

- Two ingredients interact:

Qualitative Channels

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 - a. **Fixed** v.s. **variable** cost trade-off for matching the data.
 - b. Roundabout production: fixed costs come from final goods.

Qualitative Channels

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 - ▶ Stronger rise in measure of varieties abroad in final goods.
 - ▶ Lowers sunk/fixed costs.
 - ▶ Further amplification.

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- Two countries: Home (H) and Foreign (F).
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 - ▶ Focus on H in the exposition.
 - ▶ Superscript $*$ pertains to F activities.
- Labour is the only factor of production.
- Time is discrete $t \in \{0, 1, 2, \dots\}$.
- Four agents in each country: households, government, intermediate goods firms, final goods firms.

Households

- Objective

$$U_0 = \sum_{t=0}^{\infty} \underbrace{\beta^t}_{\text{Discount factor}} \left[\underbrace{C_t}_{\text{Consumption}} - \underbrace{\frac{N_t^{1+\frac{1}{\phi}}}{1+\frac{1}{\phi}}}_{\text{Labour disutility}} \right]$$

where ϕ is the Frisch elasticity.

Households

- Labour supply aggregator (as in Blanchard & Giavazzi, 2003)

$$N_t = \left(\int_{\omega \in \Omega_t^P} \underbrace{n_t(\omega)^{\frac{1+\theta}{\theta}}}_{\text{Employment } \omega} d\omega \right)^{\frac{\theta}{1+\theta}}$$

where $\theta > \phi$ is firm-level elasticity of labour supply.

Households

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$$N_t = \overbrace{\left(\underbrace{\Omega_t^P}_{\text{Mass employers}} \right)^{\frac{\eta}{1+\theta}} \left(\int_{\omega \in \Omega_t^P} \underbrace{n_t(\omega)}_{\text{Employment } \omega}^{\frac{1+\theta}{\theta}} d\omega \right)^{\frac{\theta}{1+\theta}}}_{\text{LOVE control}}$$

where $\theta > \phi$ is firm-level elasticity of labour supply.

- $\eta = 1$ eliminates LOVE in employment.

Households: Illustrating LOVE

- Aggregate hours for production:

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- For constant L_t , see that

$$N_t = \frac{L_t}{(\Omega_t^P)^{\frac{1-\eta}{1+\theta}}}$$

Households

- Budget constraint

$$\underbrace{P_t C_t}_{\text{CPI}} = \underbrace{W_t}_{\text{Wage}} \underbrace{N_t}_{\text{Labour supply}} + \underbrace{\Pi_t}_{\text{Profits}} + \underbrace{T_t}_{\text{Tax re-distributions}}$$

Households

- Labour supply curve

$$n_t(\omega) = \underbrace{B_t}_{\text{Aggregates}} \underbrace{w_t(\omega)^\theta}_{\text{Wage at firm } \omega}$$

used in the intermediate firms' problem.

- Where θ is elasticity of labour supply.

Final Goods Firms

- Perfectly competitive.
- Aggregator

$$A_t = \left(\underbrace{\int_{\omega \in \Omega_t^U} \underbrace{q_t(\omega)^{\frac{\sigma-1}{\sigma}}}_{\text{Demand } \omega} d\omega}_{\text{Mass consumed}} \right)^{\frac{\sigma}{\sigma-1}}$$

where $\sigma > 1$ is elasticity of substitution.

- Tariff $\hat{\tau}^X$ paid on imported varieties.

Intermediate Goods Firms

- Objective

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \underbrace{d_t}_{\text{Dividend}}$$

- Production technology

$$\underbrace{y_t}_{\text{Output}} = \underbrace{z_t}_{\text{Productivity}} n_t$$

- Productivity law of motion

$$\log(z_t) = \rho_z \log(z_{t-1}) + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma_z^2)$$

Intermediate Goods Firms

- Discrete choice of status s_{t+1} for next period
 - ▶ Exit (E),
 - ▶ Domestic (D),
 - ▶ Exporter (X),
 - ▶ Multinational (M).

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- Discrete choice of status s_{t+1} for next period
 - ▶ Exit (E),
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 - ▶ Multinational (M).
- Pay fixed cost $f_t(s_t, s_{t+1})$ for $s_t, s_{t+1} \in \{D, X, M\}$.
 - ▶ One-time sunk cost of upgrading if $s_{t+1} \neq s_t$.
 - ▶ Only period-by-period fixed cost if $s_{t+1} = s_t$.

Intermediate Goods Firms

- Iceberg costs of exporting and FDI $\tau^s \geq 1$ for $s \in \{X, M\}$ (as in Arkolakis, Ramondo, Rodriguez-Clare & Yeaple, 2018).
- Tax on outward FDI profits $\hat{\tau}^M \in [0, 1]$ as in Spencer (2022).
- New entrants pay sunk cost f^T and commence with D status; initial productivity drawn from ergodic distribution.

Equilibrium

- Equilibrium is defined such that
 - ▶ All agents are optimising,
 - ▶ All markets are clearing,
 - ▶ Free entry condition holds, [Show](#)
 - ▶ Cross-sectional measure satisfies its law of motion, [Show](#)
 - ▶ Government budget constraint holds. [Show](#)

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Calibration Details

- Conduct tariff reduction exercises with FDI prohibitively costly.
- Five sets of calibrations (C1–C5) for tariff exercises:
 - ▶ C1: firms set wages, $\theta < \infty$ and $\eta = 0$ (WMD, LOVE, USLS),
 - ▶ C2: same as C1 but firms are wage-takers (LOVE, USLS),
 - ▶ C3: same as C1 but $\eta = 1$ (WMD, USLS),
 - ▶ C4: same as C2 but $\eta = 1$ (USLS),
 - ▶ C5: $\theta \rightarrow \infty$ (none).

Calibration Details

- Another 5 parameterisations where FDI is not prohibitively costly.
- Same setups as C1–C5.

Parameters set outside model

Parameters set inside model

Moments

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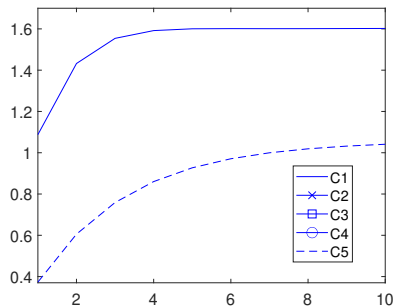
Exercises

- Consider two exercises:
 - ▶ Bilateral reduction of export tariff to zero.
 - ▶ Bilateral reduction of FDI tax to zero.
- MIT shock: unforeseen and permanent announced at time $t = 0$.

Bilateral Tariff Reduction

Export Tariff

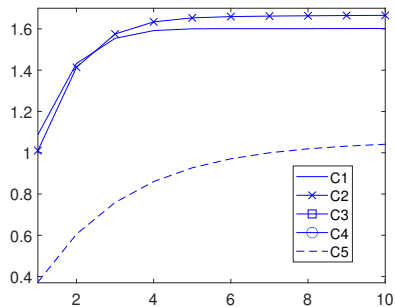
Bilateral Tariff Reduction



Exporter measure

- **Axes:** X time (years) and Y % deviation from steady state.
- Imperfect v.s. perfect → C1 v.s. C5,

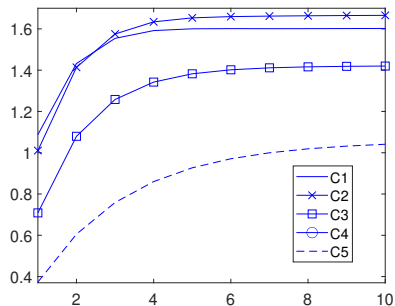
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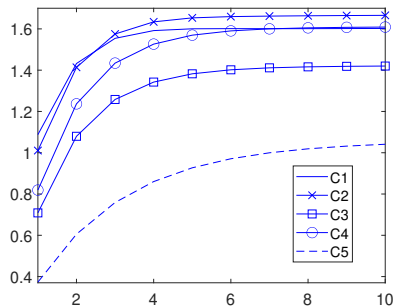
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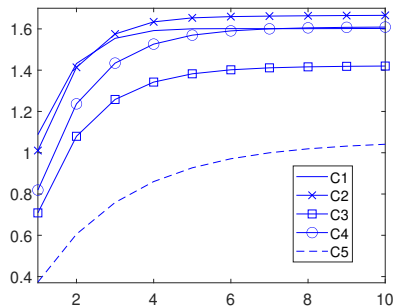
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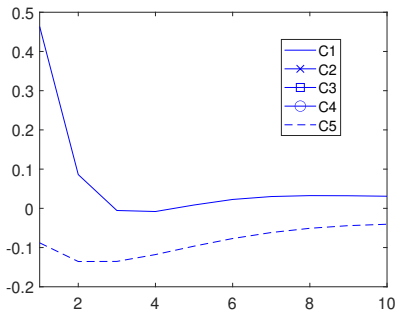
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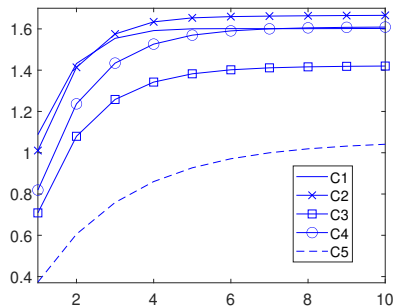
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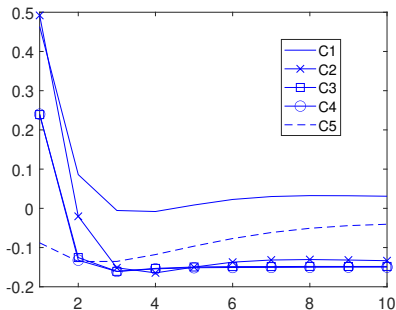
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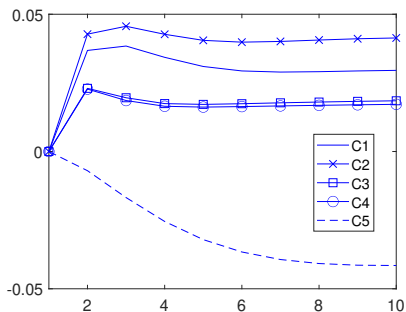
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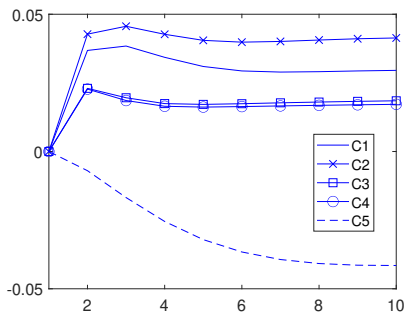
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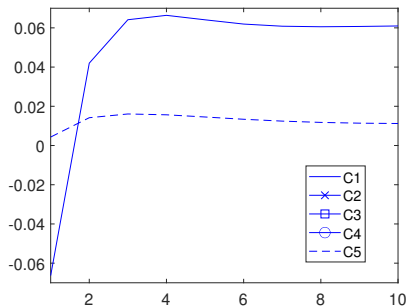
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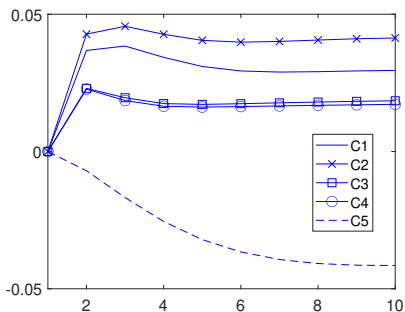
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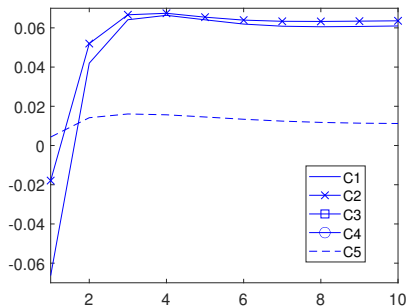
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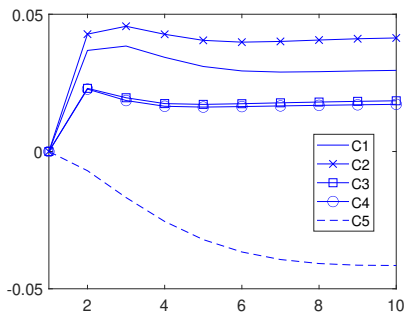
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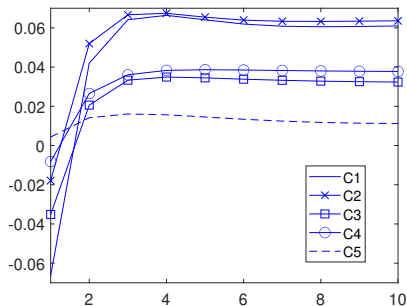
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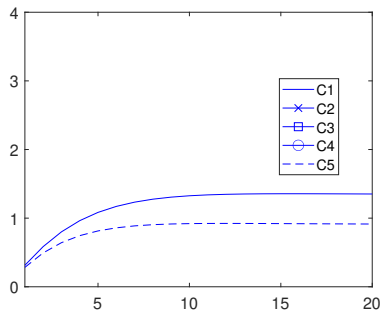
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Bilateral FDI Tax Reduction

FDI Tax

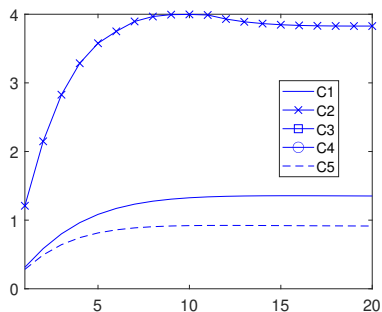
Bilateral FDI Tax Reduction



Multinational measure

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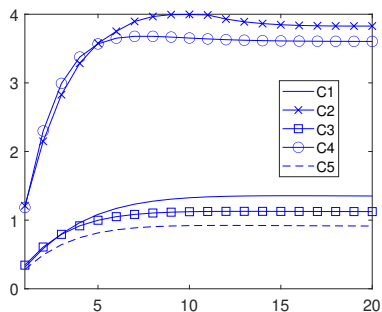
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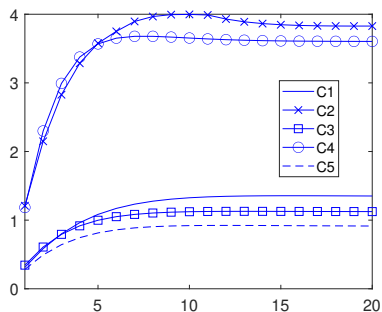
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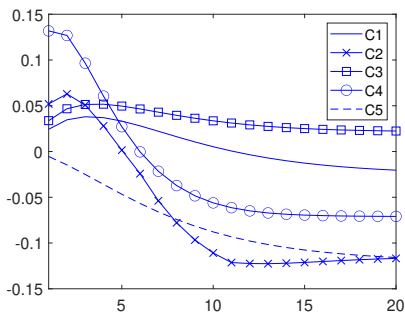
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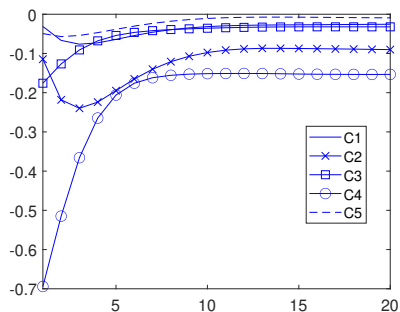
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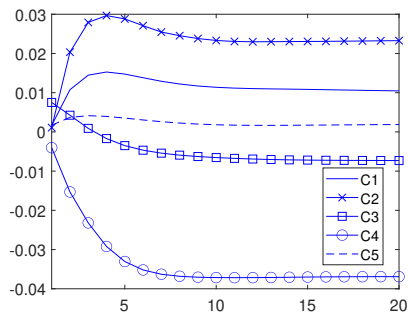
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Entry measure



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Summary

- How does labour market power quantitatively affect the welfare gains of liberalisation episodes?
- Developed a general framework with dynamics and monopsony power.
- Tariff reduction: 1% with perfect competition v.s. 5% with monopsony.

Entrants

- Value function

$$v_t^T = -f^T + \beta \underbrace{\mathbb{E}_t^T}_{\text{Ergodic distribution}} [v_{t+1}(z_{t+1}, D)]$$

Equilibrium definition

Cross-Sectional Law of Motion

- Define cross-sectional measure as $\mu_t(z_t, s_t)$

$$\mu_{t+1}(z_{t+1}, s_{t+1})$$

$$= \sum_{s_t \in \{D, X, M\}} \int_{z_t} \int_{f_t} \mathbb{1}_{s_{t+1}=s_{t+1}(z_t, s_t)} \underbrace{Q(z_{t+1}|z_t)}_{\text{Productivity}} \overbrace{H(f_t)}^{\text{Sunk cost shocks}} \mu_t(dz_t, s_t)$$

$$+ \underbrace{M_t^T}_{\text{Measure entrants}} \mathbb{1}_{s_{t+1}=D} \underbrace{Q^t(z_{t+1})}_{\text{Ergodic distribution}}$$

Equilibrium definition

Cross-Sectional Law of Motion

- Government budget constraint

$$T_t = \underbrace{(\hat{\tau}^X - 1)I_t}_{\text{Import tariffs}} + \underbrace{\hat{\tau}^M \Pi_t^{M*}}_{\text{FDI taxes}}$$

Equilibrium definition

Parameters Set Outside the Model

Parameter	Symbol	Value	Source
Discount factor	β	0.98	Literature
Frisch elasticity	ϕ	0.20	Literature
Elasticity of labour supply	θ	1.08	Literature
Love of variety control	η	0.00	Baseline
Elasticity of substitution	σ	5.00	Literature
Exporting tariff in C1	$\hat{\tau}^X$	1.10	Literature
Persistence of productivity	ρ_z	0.66	Compustat
Variability of productivity	σ_z	0.22	Compustat

Calibration

Parameters Set Inside the Model

Parameter		Calibration				Target
		C1	C5	C6	C10	
Sunk cost of entry	f^T	0.295	0.430	0.299	0.468	Unit wage
Sunk cost of (D, X) ave	$\widehat{f}^{X,D}$	0.029	0.193	0.025	0.144	Transition (D, X)
Fixed cost of X	$f^{X,C}$	0.012	0.035	0.012	0.031	Transition (X, X)
Sunk cost variability	σ_f	0.400	0.900	0.550	6.000	Transition (X, E)
Fixed cost	f^C	0.463	0.210	0.468	0.210	Exit rate
Physical iceberg cost X	τ^X	1.350	1.400	1.330	1.322	Export intensity
Export tariff	$\widehat{\tau}^X$	1.100	1.070	1.120	1.120	Taxes/Output C1
Sunk cost of (D, M) ave	$\widehat{f}^{M,D}$			0.174	0.303	Transition (D, M)
Sunk cost of (X, M) ave	$\widehat{f}^{M,X}$			0.149	0.176	Transition (X, M)
Sunk cost of (M, X) ave	$\widehat{f}^{X,M}$			0.066	0.128	Transition (M, X)
Fixed cost of M	$f^{M,C}$			0.081	0.066	Transition (M, M)
Physical iceberg cost M	τ^M			1.855	1.235	FDI sales intensity
FDI tax	$\widehat{\tau}^M$			0.010	0.022	Taxes/Output C1

Moments

Moment	Calibration			Calibration			Source
	Data	C1	C5	Data	C6	C10	
Transition (D, X)	0.011	0.012	0.012	0.011	0.027	0.015	Compustat
Transition (X, X)	0.872	0.878	0.878	0.820	0.821	0.827	Compustat
Transition (X, E)	0.074	0.050	0.050	0.070	0.076	0.053	Compustat
Exit rate	0.110	0.120	0.120	0.110	0.120	0.100	Literature
Export intensity	0.157	0.157	0.157	0.157	0.154	0.157	Compustat
Taxes/Output $\hat{\tau}^X$	0.002	0.002	0.002	0.002	0.002	0.002	C1
Transition (D, M)				0.022	0.023	0.024	Compustat
Transition (X, M)				0.060	0.078	0.075	Compustat
Transition (M, X)				0.004	0.001	0.001	Compustat
Transition (M, M)				0.890	0.888	0.887	Compustat
FDI sales intensity				0.299	0.300	0.300	Compustat
Taxes/Output $\hat{\tau}^M$				0.002	0.002	0.002	C1

Calibration