The Micro and Macro Dynamics of Capital Flows

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Motivation

- Large expansion of capital flows over the last decades.

- Understanding their implications requires assessing their effect on allocation of resources within and across industries.

- Macro papers link inflows to the expansion in non-tradable activities.

$\rightarrow$ (European crisis: Reis 2013, Benigno and Fornaro 2014, Benigno et al 2015...)

- Yet, the absence of data on service firms hinders the identification of the forces shifting resources between sectors.

This Paper

I. Assess the impact of capital flows employing

- firm-level census data for Hungary on all economic activities over 1995-2008.
  - Build from micro to macro, and assess the extensive margin.
  - 2001 Quasi natural experiment: Financial deregulation in 2001.

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II. Investigate two channels leading to resource allocation

- Relative input-cost channel: lower the relative price of capital.
    - favors industries with high capital elasticity.

- Consumption channel: increases current consumption.
    - favors industries producing high expenditure-elasticity goods.

$\rightarrow$ *Use diff. in capital and expenditure elasticities to assess impact of capital flows.*

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III. Build a small open economy model to assess impact of capital flows

- Two sectors: manufacturing and services, composed by heterogeneous firms.
- Economy transitioning to financial autarky steady state opens to capital flows.
- Study impact of capital flows on resource allocation within and across sectors.

1. Financial Liberalization in Hungary and Data

International Financial Liberalization in Hungary

$\rightarrow$ In 2001, Hungary deregulated capital controls leading to capital inflows.

Financial Account: Net Inflows
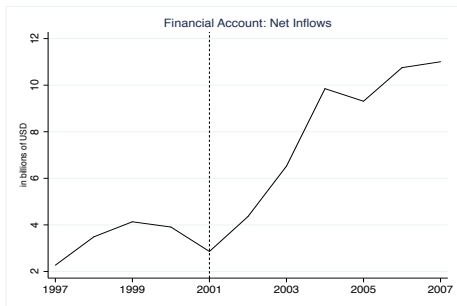
	Before 1995-2000	After 2001-2008
	(1)	(2)
Financial account (net)*	2.5	8.2
NFA/GDP	-62	-87
Credit-to-GDP ratio	25	49
Lending interest rate	22	10
Consumption/GDP	74	77

Note: in %. *In billions of USD dollars. Year averages.
Source: NBH, IMF.

▸ Reform   ▸ Capital Flows   ▸ More

Data

- APEH (NBH), census data on all firms in the economy (1995-2008).
- Accounts for more than 95% of empl. in agriculture, manufacturing and services.
    - → in 2000, about 150,000 firms, 4 employees, 80% in services. ▸ Table

→ **Identification Strategy (Diff-in-Diff)**

- Three sources of variation:
    1. Time: reform (2001).
    2. Cross sectional: capital elasticity (4-digit industries, WLP 2009).
    3. Cross sectional: expenditure elasticity (2-digit industries, Bils et al 2013).
- Potential concerns: parallel-trend assumption, survival, firms' characteristics.

▸ Correlation elasticities ▸ Growth ▸ Survival ▸ Characteristics

2. Empirical Design

Model Intuition

- Non-homothetic preferences à la Comin et al (2020):

$$1 = \sum_j \theta_j^{\frac{1}{\eta}} \, C_t^{\frac{e_j - \eta}{\eta}} \, C_{j,t}^{\frac{\eta - 1}{\eta}}$$

where e_j: expenditure elasticity of sector j, $C_{j,t}$ is composed by intermediate varieties.

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- Firm heterogeneous model (à la Melitz):

$$q_{(\varphi)t} = \varphi \, k_t^{\alpha_j} l_t^{\beta_j}$$

φ is productivity, α_j: capital elasticity of sector j, input-cost index $\phi_{j,t} \equiv \left(\frac{r_t^k}{\alpha_j}\right)^{\alpha_j} \left(\frac{w_t}{\beta_j}\right)^{\beta_j}$.

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- Optimal production for each firm:

$$q_{jt}(\varphi) = \left[\left(\frac{\phi_j}{\varphi \rho} \right)^{-\sigma} \theta_j C_t^{e_j} P_{j,t}^{\sigma - \eta} P_t^{\eta} \right]$$

  → Relative input-cost and consumption channels.

Empirical Design

- Re-write optimal production for each firm

$$\log(q_{jt}(\varphi)) = \underbrace{-\alpha_j \eta \log(r_t^k/w_t)}_{\text{input-cost channel}} + \underbrace{e_j \log(C_t)}_{\text{consumption channel}} - (\alpha_j + \beta_j)\eta \log(w_t) + (\sigma - \eta)\tilde{\varphi}_{jt} + \eta \log(P_t) + D_{\varphi j}.$$

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- In a diff-in-diff estimator:

$$\log(q_{ijt}) = \gamma_0 FL_t + \gamma_1(\alpha_j \times FL_t) + \gamma_2(e_m \times FL_t) + \gamma_3((\alpha_j + \beta_j) \times FL_t) + \gamma_4 \tilde{\varphi}_{jt} + \mu_i + \varepsilon_{it}$$

where $FL_t = 1$ if year ≥ 2001, 0 otherwise, μ_i are firm-FE, $\tilde{\varphi}_{jt} = \frac{1}{\sigma-1} \log \left[\int_{\varphi_{jt}^*} \varphi^{\sigma-1} \mu(\varphi) d\varphi \right]$.

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- In first differences:

$$\Delta q_{ij} = \gamma_0 + \gamma_1 \alpha_j + \gamma_2 e_m + \gamma_3 (\alpha_j + \beta_j) + \gamma_4 \Delta \tilde{\varphi}_j + \Delta \varepsilon_i \qquad (1)$$

where $\Delta q_{ij} = \log(\frac{1}{8} \sum_{2001}^{2008} q_{ij}) - \log(\frac{1}{6} \sum_{1995}^{2000} q_{ij})$

- γ_1: impact across capital-elasticity industries (j: four-digit industry).
- γ_2: impact across expenditure-elasticity industries (m: two-digit industry).
- Standard errors are clustered at the four-digit industry level.

3. Empirical Results:

Firm, industry and aggregate level analysis

Summary of Empirical Results

→ **Firm-level results show that:**

    1. Capital-intensive sectors: firms increase value added & capital (p25-p75: 3.5%).

    2. High expenditure elasticity sectors: firms increase value added (p25-p75: 4%).

→ **Industry-level results show that:**

    • High expenditure elasticity sectors:
- – higher net entry (p25-p75: 20%), entrants are smaller & less productive.
- – from agriculture ($e_m = 0.44$) to bars ($e_m = 1.8$) 800 net entrants more per year.
- – smaller firm-size, lower RTFP and higher price level.

	Firm-Level Analysis	Industry-Level Analysis				Entrants	
	Value Added	Δ Net Entrants	Δ Entrants	Δ Firm Size (VA × firm)	Δ Industry RTFP	Log VA	Log RTFP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capital elasticity	0.752**	-0.984	-1.481**	0.645	0.552	0.404**	1.327***
	(0.361)	(0.724)	(0.593)	(0.570)	(0.518)	(0.205)	(0.323)
Expenditure elasticity	0.079*	0.420***	0.325***	-0.138*	-0.144*	-0.038*	-0.090**
	(0.044)	(0.112)	(0.117)	(0.076)	(0.079)	(0.023)	(0.040)
Average sectoral RTFP	yes						
Returns to scale	yes						
R^2	0.002	0.042	0.039	0.015	0.014	0.127	0.096
N	56,525	348	348	348	348	185,609	95,576

Notes: *, **, *** significant at 10, 5, and 1 percent. Source: APEH.

4. Model Economy

Household

- Non-homothetic preferences on manufacturing (M) and services (S):

$$U = \sum_{t=0}^{\infty} \beta^t \frac{(C_t^{1-\gamma}-1)}{1-\gamma} \qquad \text{and} \qquad 1 = \left[\theta_M^{\frac{1}{\eta}} C_t^{\frac{e_M-\eta}{\eta}} C_{M,t}^{\frac{\eta-1}{\eta}} + \theta_S^{\frac{1}{\eta}} C_t^{\frac{e_S-\eta}{\eta}} C_{S,t}^{\frac{\eta-1}{\eta}} \right]$$

e_M & e_S: expenditure elasticities.

- M composed by D & F goods: $C_{Mt} = \left[\theta_D^{\frac{1}{\eta_M}} C_{Mt}^{D\ \frac{\eta_M-1}{\eta_M}} + \theta_F^{\frac{1}{\eta_M}} C_{Mt}^{F\ \frac{\eta_M-1}{\eta_M}} \right]^{\frac{\eta_M}{\eta_M-1}}$

- M^D and S composed by differentiated varieties: $C_{d,j,t} = \left[\int_{\omega \in \Omega_t} c_{j,t}(\omega)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$

→ **Budget constraint**

$$P_{M,t}^D C_{M,t}^D + C_{M,t}^F + P_{S,t} C_{S,t} + K_{t+1} - (1-\delta^k) K_t + B_{t+1} = w_t L + r_t^k K_t + (1+r_t) B_t + \Pi_t + T_t$$

▸ Demand Functions

Firms, Trade and Capital Flows

$\rightarrow$ **Production function:** $\qquad q_{jt}(\varphi) = \varphi k_{jt}(\varphi)^{\alpha_j} l_{jt}(\varphi)^{1-\alpha_j} \qquad j = \{M, S\}$

$\rightarrow$ **Foreign demand for manufacturing:** $\qquad q^x_{Mt}(\varphi) = A p_{Mt}(\varphi)^{-\sigma}$

(Fixed costs for producing and exporting.)

$\rightarrow$ **Trade balance:** $\quad TB_t = \underbrace{X_{M,t}}_{\text{Exports}} - \underbrace{C^F_{Mt} - (K_{t+1} - (1-\delta^k)K_t)}_{\text{Imports}}$

$\rightarrow$ **Capital Controls**

- Household can issue a foreign bond B, but pays a per unit tax τ.

- Domestic interest rate: $\qquad r_t = r^* + \underbrace{\tau . \mathbb{1}_{\{B_t < 0\}}}_{\text{Capital controls}} \qquad$ where $\quad r^* = \frac{1}{\beta} - 1$.

Value Functions ‣ Debt Elasticity Model ‣ Equilibrium

5. Quantitative Analysis

Financial Liberalization Experiment

→ **Calibration:**

- at annual frequency to Hungarian micro and macro data for $\tau = 0$. `▸ Table`

→ **Exercise**:

- Financial autarky: economy transitioning to the steady state.

- Financial liberalization:

  - Unexpected decrease of capital controls to $\tau = 0$.

  - 55% of capital with respect to the financial autarky steady state.

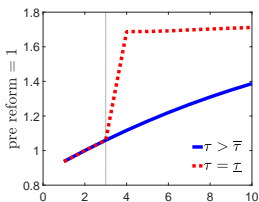 - → match 3.5% decrease in the interest rate in the post-reform period.

Relative Input-Cost and Consumption Channels

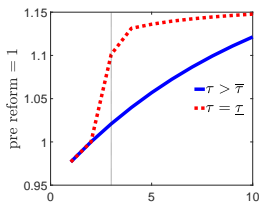-Liberalization in $t = 3 \to$ decrease in capital controls and start borrowing.
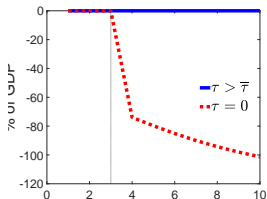
a) NFA to GDP Ratio (B/Y)
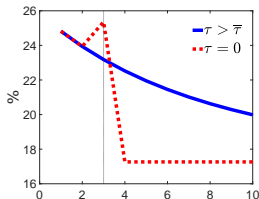
b) Capital Rental Rate

c) Capital

d) Consumption

Financial Autarky; **Liberalized Econonomy**.

Reallocation and Heterogeneous Expenditure Elasticity

	Model	Data	$\varepsilon_M = \varepsilon_S$	$\alpha_M = \alpha_S$	$\varepsilon_M = \varepsilon_S$ & $\alpha_M = \alpha_S$
	(1)	(2)	(3)	(4)	(5)
Household consumption (real) (log)	0.061	0.083			
Average within firm capital increase	0.292	0.235			
Real Consumption Ratio (S/M)	0.033	0.028			
Share of value added in services (real)	0.018	0.038			
Relative price index (S/M) (log diff)	0.018	0.052			
Relative op. cut-off (S/M) (log diff)	-0.009	-0.031			
Relative expo. cut-off (log diff)	0.029	0.040			
Relative entry rate (S/M) (log diff)	0.045	0.113			
Relative entrant size (S/M) (log diff)	-0.014	-0.020			

Note: Coefficients in column 2 are computed in a regression of the variable on a time trend and a dummy for the reform period: $y_t = \alpha FL_t + T_t + \varepsilon_t$, where $FL_t = 1$ if year ≥ 2001 and 0 otherwise. All data coefficients are significant.

- Non targeted: Cost and demand channel are quantitatively relevant.

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Average within firm capital increase	0.292	0.235	0.268		0.249
Real Consumption Ratio (S/M)	0.033	0.028	-0.011		0.001
Share of value added in services (real)	0.018	0.038	0.008		0.011
Relative price index (S/M) (log diff)	0.018	0.052	0.017		-0.001
Relative op. cut-off (S/M) (log diff)	-0.009	-0.031	0.002		-0.001
Relative expo. cut-off (log diff)	0.029	0.040	0.026		0.027
Relative entry rate (S/M) (log diff)	0.045	0.113	0.024		0.030
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- Heterogeneous α deliver changes in relative prices.

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- Homogeneous model tilts production towards services.
- Heterogeneous α deliver changes in relative prices.
- Heterogeneous ε deliver changes in relative consumption.

6. Policy Analysis

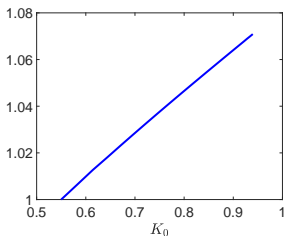# Cost and Benefits of a Financial Liberalization

1. **Faster transition:** Smoother consumption path, trade long-run consumption for short-run consumption. Lower initial capital, larger gains.

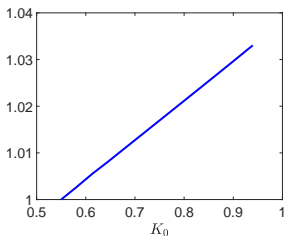# Cost and Benefits of a Financial Liberalization

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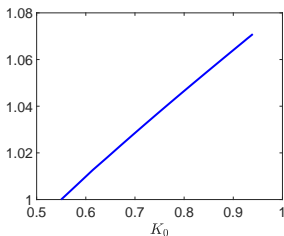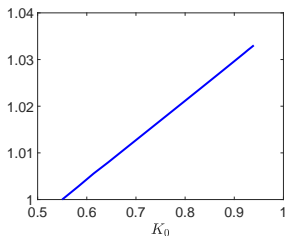
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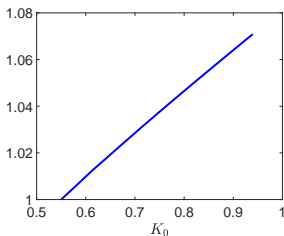

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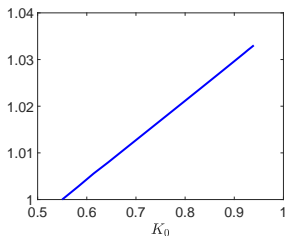a) Price   b) Capital

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- Reminiscent of Bhagwati (1958) Immiserizing Growth.

Welfare Analysis

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Welfare Analysis

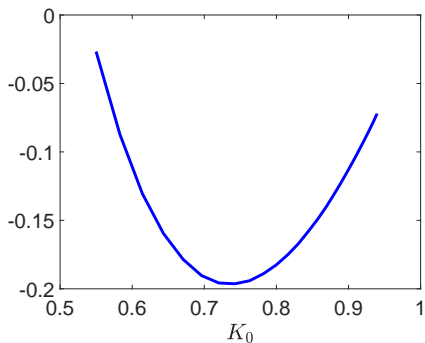$\rightarrow$ Gourinchas and Jeanne (2006): Welfare gains of a full liberalization are small.

Figure: Full liberalization CEQ Welfare (%) over Autarky

$\rightarrow$ **Financial liberalization can lead to welfare losses!**

Welfare Analysis

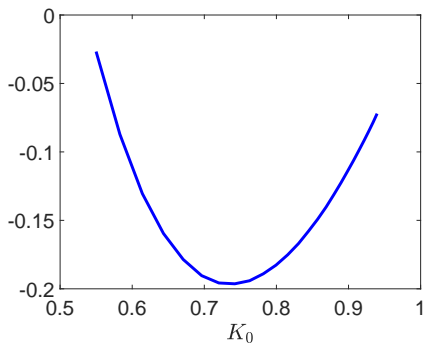$\rightarrow$ Gourinchas and Jeanne (2006): Welfare gains of a full liberalization are small.

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$\rightarrow$ Potential welfare gains from slowing down the liberalization.

Policy Analysis

$\rightarrow$ **Tax on borrowing:** $\tau_t = \max\left\{\left(1 - \left(\frac{2t}{T}\right)^\phi\right)\cdot \bar{\tau}, 0\right\}$

- Immediate full liberalization $\rightarrow \phi = 0$.

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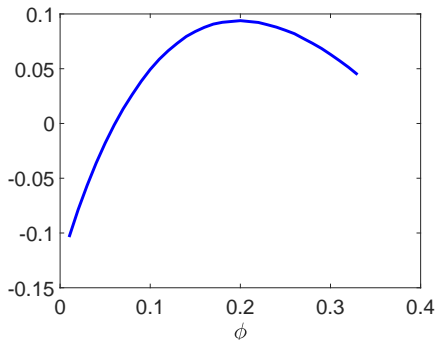
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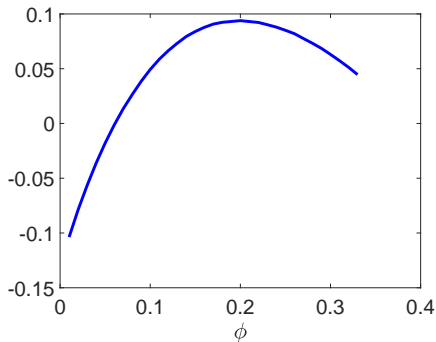- Immediate full liberalization → $\phi = 0$.

Figure: Policy Gains over Autarky CEQ Welfare (%)

→ **Slowing down the reform leads to higher long-run K and welfare gains.**

Conclusion

- This paper makes three contributions:

    1. Novel evidence about the impact of capital flows on service firms.

    2. Consumption channel is important to understand within and across sectoral reallocation of resources.

    3. In the long term, financial openness affects the structure of the economy and can lead to welfare loses.

        $\rightarrow$ Slowing down a financial liberalization can improve welfare.

Extra Slides

# Hungary: Financial Liberalization and Net Foreign Asset Position

Net Foreign Asset Position to GDP Ratio
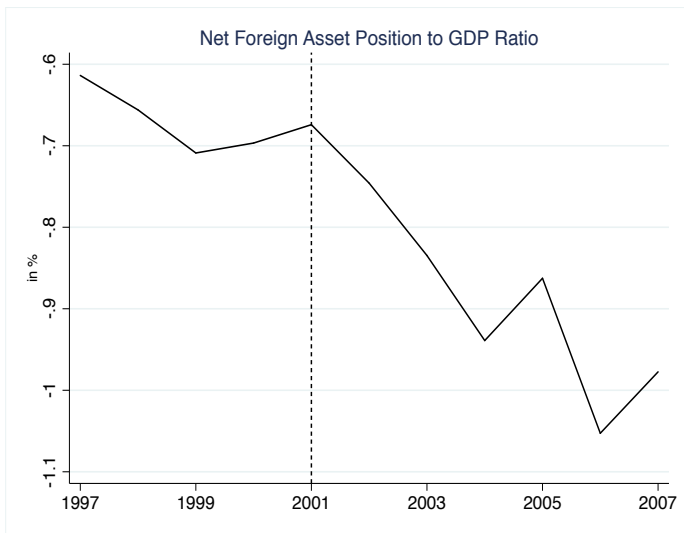
Source: Lane and Milesi-Ferreti (2018)

Hungary: Financial Liberalization and Capital Flows

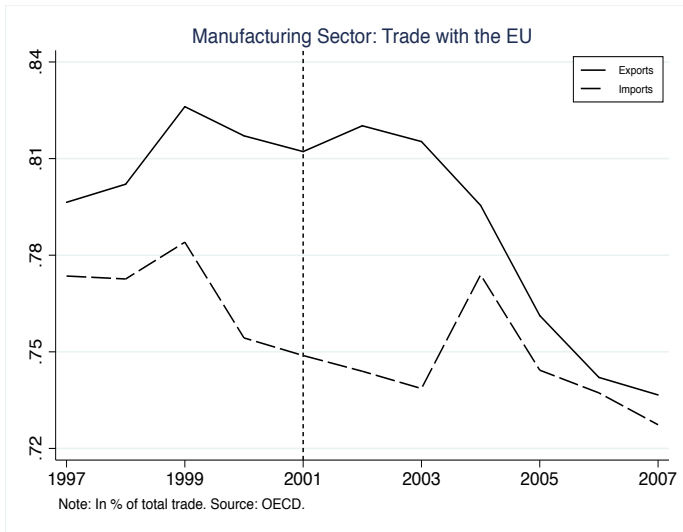| | Before 1995-2000 | After 2001-2008 | Before | | After | |
			1995-1998	1998-2000	2001-2004	2005-2008
	(1)	(2)	(3)	(4)	(5)	(6)
Financial account (net)*	2.5	8.2	1.2	3.8	6.1	10.4
NFA/GDP	-62	-87	-57	-67	-79	-95
Credit-to-GDP ratio	25	49	23	27	39	59
Lending interest rate	22	10	27	16	11	9
Consumption/GDP	74	77	74	74	77	76

Note: in %. *In billions of USD dollars. Source: NBH, IMF, Lane and Milesi-Ferreti (2018).

◀ Return

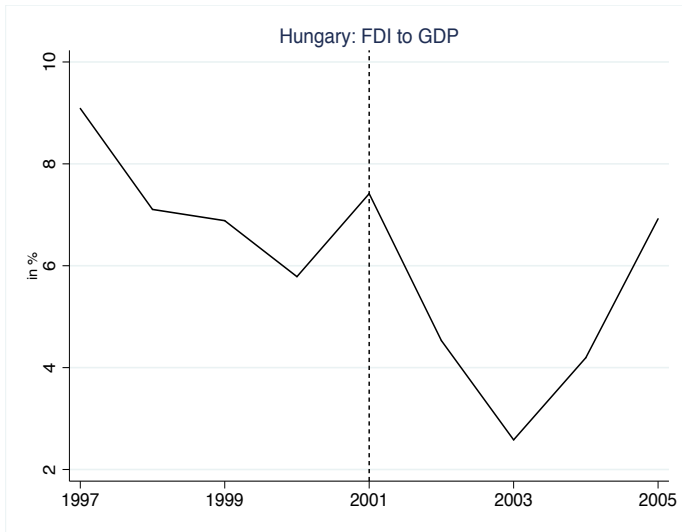# Trade with the EU

Export and Imports with the EU

Note: in % of total trade. Source: OECD.

Return
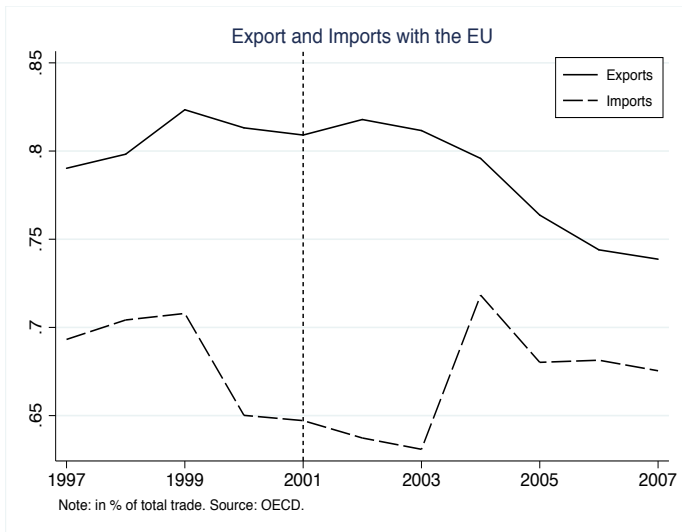
Manufacturing Trade with the EU

Manufacturing Sector: Trade with the EU

Note: In % of total trade. Source: OECD.

Foreign Direct Investment

Capital Controls in Hungary before 2001

→ **Foreign exchange (FX) market regulations were the main tool of capital controls.**

- Restrict banks' ability to intermediate foreign funds:

    → Spot and Forward FX markets:

        − Forward: banned all instruments to hedge the currency risk.

        − Spot: made very costly and difficult to acquire foreign currency.

    → Critical: costly and illiquid spot market and inexistent forward market.

    → Banks relied their credit supply on local savings, leading to low credit.

In 2000	Hungary	OECD
Credit-to-GDP Ratio	0.27	0.86
Credit-to-Deposit Ratio	0.83	1.20

◀ Return

Summary Statistics

	Agriculture	Manufacture	Services
	(1)	(2)	(3)
Value Added*	2,058	3,029	1,008
Capital*	5,200	2,140	1,038
Capital Intensity*	1,150	386	358
Employment	5	6	3
Log RTFP	5.40	5.53	5.10
Age	5	5	4
Export Share**	0.19	0.31	0.19
Number of firms	6,925	23,231	115,949

Notes: *in thousands of Forints. ** Conditional on Exporting/Importing. Median values. Average over 1995-2000. Source: APEH.

◂ Return

Identification Strategy: Firms' Characteristics across Sectors

	Mean	Capital Elasticity	Expenditure Elasticity
	(1)	(2)	(3)
Log value added	7.165	7.408***	-0.399***
		(0.225)	(0.018)
Log capital	7.103	6.211***	-0.227***
		(0.249)	(0.019)
Log employment	1.350	2.236***	-0.372***
		(0.148)	(0.011)
Log RTFP	5.139	1.146***	-0.125***
		(0.159)	(0.013)
Log age	1.319	1.058***	-0.127***
		(0.068)	(0.005)
Log export share	0.036	0.415***	-0.007***
		(0.014)	(0.001)
Number of firms	255,008	255,008	255,008

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the log of each variable on the capital and expenditure elasticities for the pre-reform period (1995-2000). Source: APEH. Source: APEH.

	Capital Elasticity			Expenditure Elasticity		
	Value Added Growth	Capital Growth	Employment Growth	Value Added Growth	Capital Growth	Employment Growth
	(1)	(2)	(3)	(4)	(5)	(6)
Capital Elasticity	-0.125	0.135	-0.080			
	(0.148)	(0.114)	(0.078)			
Expenditure Elasticity				0.003	-0.022	-0.007
				(0.014)	(0.041)	(0.005)
R^2	0.002	0.001	0.002	0.001	0.000	0.001
N	274,591	256,947	242,221	274,591	256,947	242,221
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
N	313,512	313,512	335,895	335,895	335,895	335,895

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the growth rate of each variable on the capital and expenditure elasticities for the pre-reform period (1995-2000). Source: APEH.

◀ Return

Identification Strategy: Survival Ratio

	Capital Elasticity	Expenditure Elasticity
	(1)	(2)
Survival Ratio	0.024	-0.038***
	(0.031)	(0.007)
N	103,555	103,555

Notes: *, **, *** significant at 10, 5, and 1 percent. This table reports the estimated coefficients from a regression of the survival rate between 2000 and 2007 on the capital and expenditure elasticities. All regressions include a constant term. Source: APEH.
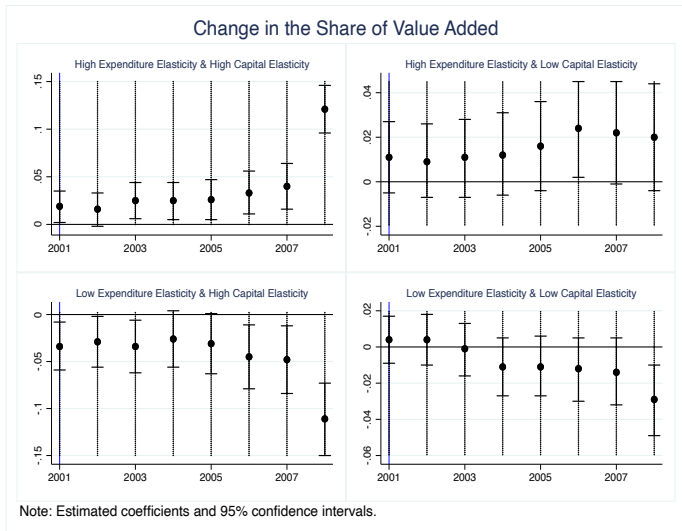
◂ Return

Firm-Level Analysis: Value Added

	Δ Value Added		
	(1)	(2)	(3)
	Capital Elasticity		
Capital elasticity	0.728**	0.701**	0.656*
	(0.351)	(0.343)	(0.342)
Average sectoral productivity		0.025	0.022
		(0.037)	(0.038)
Returns to scale			-0.122
			(0.142)
R^2	0.001	0.001	0.001
	Expenditure Elasticity		
Expenditure elasticity	0.094*	0.091*	0.102**
	(0.051)	(0.052)	(0.051)
Average sectoral productivity		0.034	0.026
		(0.036)	(0.039)
Returns to scale			-0.242
			(0.148)
R^2	0.001	0.001	0.002
	Panel C. Capital and Expenditure Elasticities		
Capital elasticity	0.752**	0.725**	0.687*
	(0.361)	(0.354)	(0.353)
Expenditure elasticity	0.079*	0.077*	0.079*
	(0.044)	(0.045)	(0.042)
Average sectoral productivity		0.025	-0.008
		(0.034)	(0.020)
Returns to scale			-0.185
			(0.141)
R^2	0.002	0.002	0.002
N	56,525	56,525	56,525

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Source: APEH.

Aggregate-Level Analysis: Expenditure and Capital Elasticities

− Aggregate sectors with high (low) expenditure and high (low) capital elasticities.

Change in the Share of Value Added

Note: Estimated coefficients and 95% confidence intervals.

$y_{s,t} = \sum_{i=2001}^{2008} \beta_i D_i + \text{Time}_t + \varepsilon_{st}$, where $D_i = 1$ if year $= i$ and 0 otherwise. ◂ Return

Aggregate-Level Analysis: Expenditure and Capital Elasticities

	High Expenditure Elasticity & High Capital Elasticity			High Expenditure Elasticity & Low Capital Elasticity			Low Expenditure Elasticity & High Capital Elasticity			Low Expenditure Elasticity & Low Capital Elasticity		
	Value Added	Empl.	Number of Firms	Value Added	Empl.	Number of Firms	Value Added	Empl.	Number of Firms	Value Added	Empl.	Number of Firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2001	0.019**	0.011**	0.013***	0.011	-0.002	0.013**	-0.034**	0.004	-0.017**	0.004	-0.013**	-0.009***
	(0.007)	(0.003)	(0.003)	(0.007)	(0.004)	(0.005)	(0.011)	(0.006)	(0.007)	(0.006)	(0.005)	(0.002)
2002	0.016*	0.019***	0.010**	0.009	-0.001	0.010	-0.029**	0.002	-0.010	0.004	-0.021***	-0.010***
	(0.007)	(0.004)	(0.003)	(0.007)	(0.005)	(0.006)	(0.011)	(0.006)	(0.007)	(0.006)	(0.005)	(0.002)
2003	0.025**	0.025***	0.010**	0.011	0.003	0.011	-0.034**	0.005	-0.004	-0.001	-0.033***	-0.017***
	(0.008)	(0.004)	(0.003)	(0.008)	(0.005)	(0.006)	(0.012)	(0.007)	(0.007)	(0.006)	(0.006)	(0.002)
2004	0.025**	0.031***	0.000	0.012	0.015**	0.025***	-0.026*	-0.005	-0.020**	-0.011	-0.041***	-0.005*
	(0.008)	(0.004)	(0.004)	(0.008)	(0.005)	(0.006)	(0.013)	(0.007)	(0.008)	(0.007)	(0.006)	(0.002)
2005	0.026**	0.039***	0.001	0.016	0.013**	0.022**	-0.031*	0.001	-0.013	-0.011	-0.053***	-0.010***
	(0.009)	(0.004)	(0.004)	(0.009)	(0.005)	(0.007)	(0.014)	(0.008)	(0.008)	(0.007)	(0.007)	(0.002)
2006	0.033***	0.046***	0.008*	0.024**	0.016**	0.019**	-0.045**	0.005	-0.004	-0.012	-0.067***	-0.024***
	(0.009)	(0.005)	(0.004)	(0.009)	(0.006)	(0.007)	(0.014)	(0.008)	(0.009)	(0.007)	(0.007)	(0.002)
2007	0.040***	0.051***	0.003	0.022*	0.018**	0.017*	-0.048**	0.011	0.004	-0.014	-0.080***	-0.024***
	(0.010)	(0.005)	(0.004)	(0.010)	(0.006)	(0.007)	(0.015)	(0.009)	(0.009)	(0.008)	(0.007)	(0.003)
2008	0.121***	0.071***	0.067***	0.020*	0.011	-0.022**	-0.111***	0.013	0.009	-0.029**	-0.096***	-0.054***
	(0.011)	(0.005)	(0.005)	(0.010)	(0.006)	(0.008)	(0.016)	(0.009)	(0.010)	(0.008)	(0.008)	(0.003)
Time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.980	0.973	0.995	0.983	0.997	0.997	0.985	0.997	0.998	0.819	0.987	0.991
N	17	17	17	17	17	17	17	17	17	17	17	17

Notes: *, **, *** significant at 10, 5, and 1 percent. Source: APEH.

Aggregate Analysis: Broadly-Defined Sectors

- Manufacturing: more capital intensive $\alpha_j = 0.36$ (vs 0.30 in S).

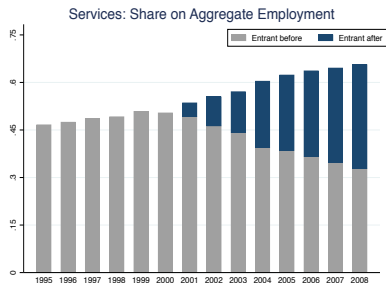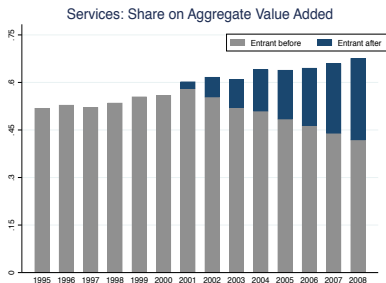- Services: high expenditure elasticity $e_m = 1.19$ (vs 0.96 in M).

Change in the Share of Services in the Economy

Note: 95% Confidence Interval
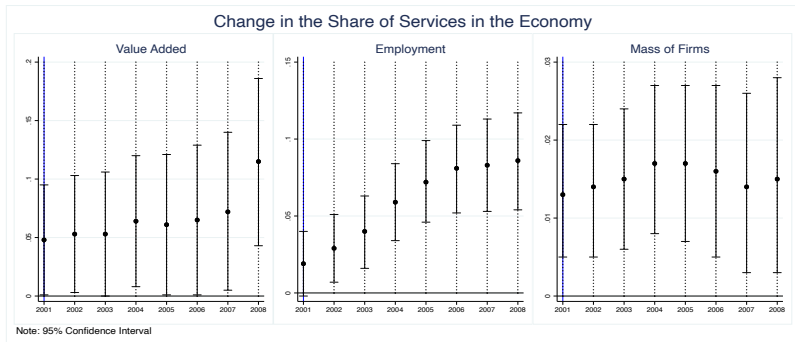
$y_{s,t} = \sum_{i=2001}^{2008} \beta_i D_i + \text{Time}_t + \varepsilon_{st}$, where $D_i = 1$ if year $= i$ and 0 otherwise.

$\rightarrow$ **Increase in the share of services in value added and employment.** ◄ Return

– Define: entrant before if entry <2001, and entrant after if entry ≥ 2001.

$\rightarrow$ **Entrants explain a non-negligible in the expansion of services.**

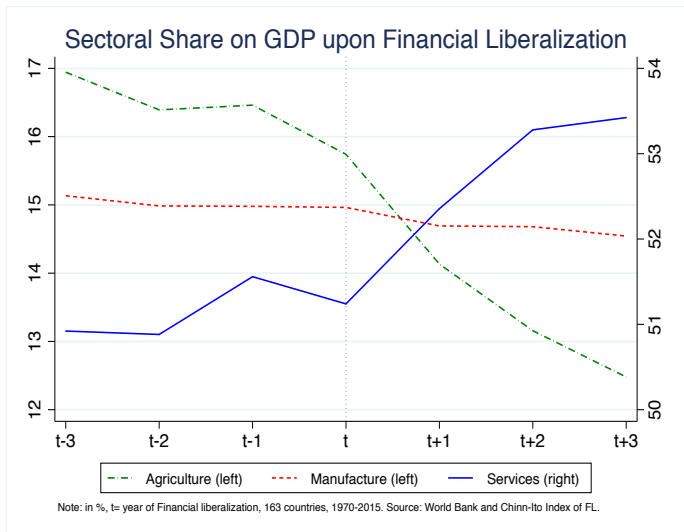## Cross-Country Evidence: Financial Liberalization and Value Added Share

Share of Value Added in Services

Note: in %, t= year of Financial liberalization, 163 countries, 1970-2015. Source: World Bank and Chinn-Ito Index of FL.

◂ Return
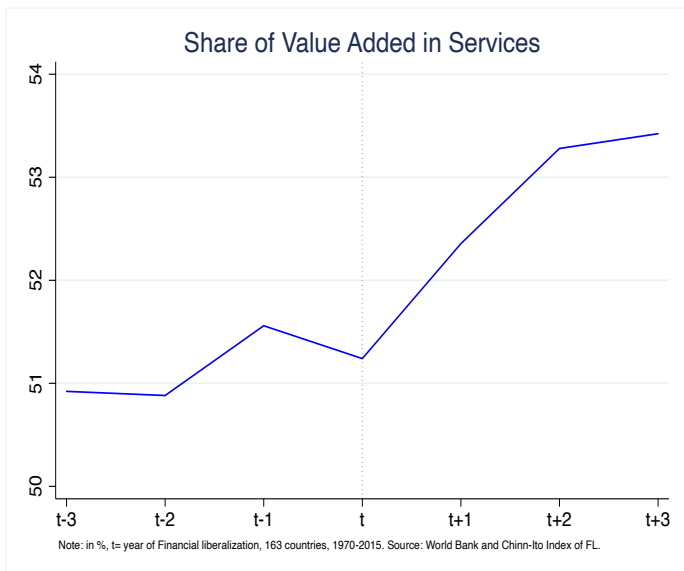
Cross-Country Evidence: FL and Structural Change

- Estimate a Arellano and Bond (1995), GMM system of 5 years non-overlapping data.

	Log share in value added										
	Agriculture			Manufacturing					Services		
	OLS	GMM		OLS	GMM				OLS	GMM	
							LDC	Developed Countries			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FL Index	-0.020***	-0.028*	-0.026***	0.007	0.032**	-0.000	0.041*	0.003	0.010**	0.007**	0.014***
	(0.007)	(0.015)	(0.008)	(0.008)	(0.015)	(0.017)	(0.022)	(0.064)	(0.004)	(0.003)	(0.005)
Trade Openness			-0.363**			-0.136	-0.613	-0.936***			0.100***
			(0.143)			(0.315)	(0.950)	(0.313)			(0.022)
Government Size			0.337***			0.132	0.735	0.862***			-0.109***
			(0.127)			(0.264)	(1.018)	(0.328)			(0.019)
Financial Depth			-0.041*			-0.017	0.018	0.015			0.032***
			(0.021)			(0.062)	(0.077)	(0.075)			(0.006)
Financial Crisis			0.034**			-0.103**	-0.033	-0.023			0.033***
			(0.015)			(0.051)	(0.054)	(0.048)			(0.006)
Lag Dep. Var.	1.006***	0.983***	1.004***	0.877***	0.827***	0.709***	0.613***	0.792***	0.817***	0.807***	0.704***
	(0.009)	(0.040)	(0.027)	(0.027)	(0.047)	(0.132)	(0.278)	(0.216)	(0.037)	(0.028)	(0.023)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	914	914	342	914	914	342	229	127	914	914	342
Countries	163	163	62	163	163	62	31	27	163	163	62
Sargan (pvalue)		0.410	0.821		0.313	0.220	0.314	0.648		0.208	0.265

Notes: *, **, *** significant at 10, 5, and 1 percent. All regressions include a constant term. Period 1970-2015. Chinn and Ito (2016) index of Financial Liberalization. Source: World Bank, IMF, Chinn and Ito (2016).

◂ Return

Cross-Country Evidence: FL and Structural Change

Sectoral Share on GDP upon Financial Liberalization

Legend: Agriculture (left) · · · Manufacture (left) --- Services (right)

Note: in %, t= year of Financial liberalization, 163 countries, 1970-2015. Source: World Bank and Chinn-Ito Index of FL.

Firm-Level Analysis: Capital and Employment

	Δ Capital			Δ Employment		
	(1)	(2)	(3)	(4)	(5)	(6)
	Capital and Expenditure Elasticities					
Capital elasticity	1.033***	1.008***	1.030***	0.516	0.456	0.408
	(0.364)	(0.369)	(0.354)	(0.317)	(0.315)	(0.295)
Expenditure elasticity	-0.083	-0.085	-0.088	0.119***	0.114***	0.123***
	(0.064)	(0.064)	(0.061)	(0.040)	(0.038)	(0.035)
Average sectoral productivity		0.023	0.024		0.058***	0.054***
		(0.019)	(0.023)		(0.015)	(0.018)
Returns to scale			0.058			-0.130
			(0.151)			(0.112)
R^2	0.002	0.002	0.002	0.004	0.006	0.006
N	53,987	53,987	53,987	54,251	54,251	54,251

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Source: APEH.

Firm-Level Analysis: Value Added

$\rightarrow$ No differential trend before the reform, but higher growth according with capital and expenditure elasticities after it.

Note: Estimated coefficients and 95% confidence intervals.
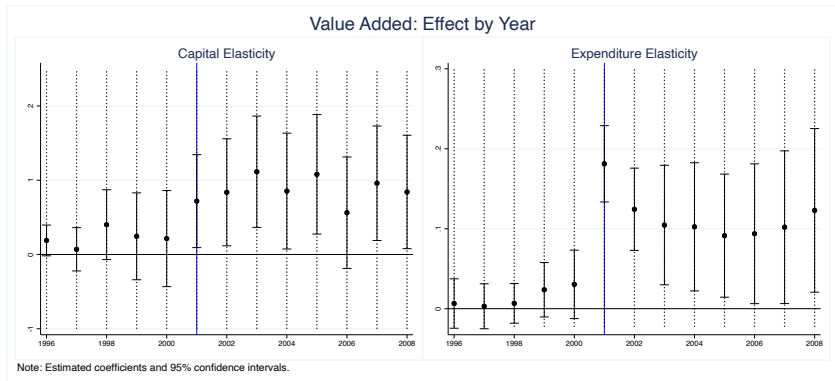
Robustness: Non-Exporters and Domestic Firms

	Non-Exporters			Domestically-Owned Firms		
	Δ Value Added	Δ Capital	Δ Employment	Δ Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)
Capital elasticity	0.887**	1.274***	0.546*	0.653*	1.030***	0.408
	(0.399)	(0.387)	(0.327)	(0.368)	(0.354)	(0.295)
Expenditure elasticity	0.087*	-0.100	0.125***	0.103**	-0.088	0.123***
	(0.052)	(0.065)	(0.040)	(0.048)	(0.061)	(0.035)
Average sectoral productivity	0.042	0.035	0.061***	0.024	0.024	0.054***
	(0.036)	(0.028)	(0.019)	(0.038)	(0.023)	(0.018)
Returns to scale	-0.268*	0.022	-0.171	-0.210	0.058	-0.130
	(0.162)	(0.168)	(0.123)	(0.153)	(0.151)	(0.112)
R^2	0.004	0.003	0.007	0.003	0.002	0.006
N	49102	46636	46805	56525	53987	54251

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Columns 1-3 exclude multinational firms (where MNC are firms with 10% foreign ownership). Columns 4-6 exclude exporters. Columns 7-9 exclude government firms (firms with more than 50% local and state shares). Source: APEH.

◄ Return

Robustness: Firms without Debt

	Credit Registry	Balance Sheet Data					Credit Registry + BS Data
	No ST or LT	No LT	ST Obligations				No Credit or LT/ST
	Credit	Obligations	w/ Owners	Trade Credit	w/ Banks	All	Obligation
						=(3)+(4)+(5)	=(1)+(2)+(6)
				Value Added			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capital elasticity	0.126	-0.193	0.416	0.107	0.064	-0.209	-0.854
	(0.397)	(0.508)	(0.509)	(0.754)	(0.492)	(1.151)	(1.400)
Expenditure elasticity	0.152**	0.232**	0.232**	0.350**	0.186*	0.608***	0.737***
	(0.063)	(0.103)	(0.091)	(0.141)	(0.100)	(0.193)	(0.217)
Average sectoral productivity	yes	yes	yes	yes	yes	yes	yes
Returns to scale	yes	yes	yes	yes	yes	yes	yes
R^2	0.003	0.007	0.008	0.024	0.006	0.066	0.081
N	27,790	23,358	20,989	8,420	22,583	4,410	2,508

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. Column 1 excludes firms reporting short term (ST) and/or long term (LT) credit in the credit registry data. Columns 2 to 6 consider liabilities obligations reported in balance sheet data. Column 2 excludes firms reporting long-term obligations. Column 3 excludes firms reporting short-term loans with owners, column 4 excludes firms reporting short-term trade credit, column 5 excludes firms reporting short-term credit with financial institutions, and column 6 excludes firms reporting all short-term obligations. Column 7 excludes firms reporting any type of short or long term obligation or credit reported either in the credit registry or balance sheet data. Source: APEH and credit registry.

◂ Return

Robustness: Financial Dependence

	Rajan and Zingales			Inventories to Sales			Cash Conversion Cycle		
	Δ Value Added	Δ Capital	Δ Employment	Δ Value Added	Δ Capital	Δ Employment	Δ Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital elasticity	0.701*	1.322***	0.666**	0.729**	1.205***	0.580**	0.681*	1.245***	0.589**
	(0.361)	(0.394)	(0.285)	(0.366)	(0.360)	(0.284)	(0.391)	(0.356)	(0.283)
Expenditure elasticity	0.077*	-0.096	0.105***	0.114*	-0.120	0.071*	0.106*	-0.103	0.103***
	(0.041)	(0.074)	(0.039)	(0.064)	(0.074)	(0.042)	(0.062)	(0.072)	(0.039)
Financial Dependence	0.011**	-0.008	-0.003	0.136	-0.255	-0.334**	0.025	-0.022	-0.005
	(0.005)	(0.007)	(0.005)	(0.201)	(0.177)	(0.155)	(0.028)	(0.021)	(0.003)
Average sectoral productivity	yes	yes	yes	yes	yes	yes	yes	yes	yes
Returns to scale	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.005	0.003	0.005	0.005	0.003	0.005	0.006	0.003	0.004
N	47,549	45,723	46,163	46,723	44,652	45,020	46,831	44,754	45,127

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit NACE industries. Columns 1-3 include as a control the Rajan and Zingales (1988) index. Columns 4-6 controls for the inventories to sales index and columns 7-9 controls for the cash conversion cycle, both estimated as in Raddatz (2006). The three financial dependence measures are estimated at four-digit NACE industries. Source: APEH.

◄ Return

Robustness: Price index

	Δ Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital elasticity	0.671*	1.135***	0.603**
	(0.365)	(0.350)	(0.280)
Expenditure elasticity	0.080*	-0.103	0.101***
	(0.047)	(0.063)	(0.034)
Sectoral price index	-0.024	0.182***	0.315***
	(0.312)	(0.069)	(0.069)
Returns to scale	-0.175	0.007	-0.226**
	(0.137)	(0.135)	(0.096)
R^2	0.002	0.003	0.008
N	56,525	53,987	54,251

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Source: APEH.

◂ Return

Robustness: Panel Regressions

	Log Value Added (1)	Log Capital (2)	Log Employment (3)
FL * Capital Elasticity	0.534*	1.068**	0.573*
	(0.316)	(0.392)	(0.304)
FL * Income Elasticity	0.066*	-0.072	0.098**
	(0.039)	(0.065)	(0.039)
Average sectoral productivity	0.027***	0.016*	0.020**
	(0.008)	(0.008)	(0.008)
FL * Returns to scale	-0.158	0.130	-0.099
	(0.130)	(0.144)	(0.109)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R^2	0.802	0.865	0.781
N	905,630	846,162	791,981

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at year and four-digit sector levels. Source: APEH.

◂ Return

Robustness: Standardized Beta Coefficient: Firm-level

	Δ Value Added (1)	Δ Capital (2)	Δ Employment (3)
Capital elasticity	0.029*	0.035***	0.022
	(0.015)	(0.012)	(0.016)
Expenditure elasticity	0.031*	-0.027	0.060***
	(0.016)	(0.019)	(0.017)
Average sectoral productivity	-0.007	0.013	0.043***
	(0.017)	(0.012)	(0.014)
Returns to scale	-0.023	0.006	-0.020
	(0.017)	(0.015)	(0.017)
R^2	0.002	0.002	0.006
N	56,525	53,987	54,251

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Source: APEH.

	Industry-Level Analysis	
	Δ Net Entrants	Δ Entrants
	(1)	(2)
Capital elasticity	-0.074	-0.114**
	(0.054)	(0.046)
Expenditure elasticity	0.194***	0.154***
	(0.052)	(0.055)
R^2	0.042	0.039
N	348	348

Notes: *, **, *** significant at 10, 5, and 1 percent. Source: APEH.

Correlation Capital and Expenditure Elasticities
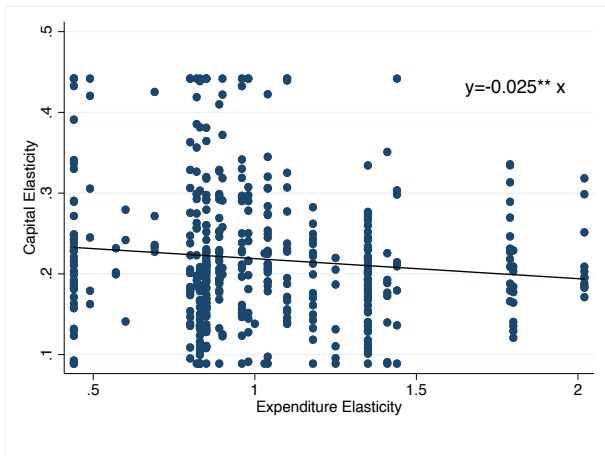
Expenditure Elasticities across Sectors
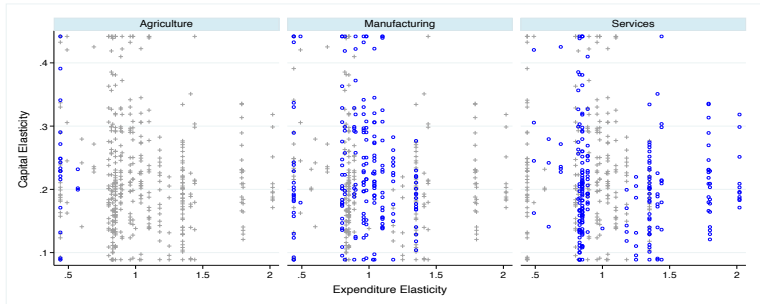
Robustness: Expenditure and Capital Elasticities

	Capital Elasticity Olley and Pakes (1996)			Expenditure Elasticity Comin, Lashkari, Mestiere (2018)		
	Δ Value Added	Δ Capital	Δ Employment	Δ Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)	(4)	(5)	(6)
Capital elasticity	0.800**	0.888***	0.887***	0.873**	1.211***	1.073***
	(0.321)	(0.244)	(0.201)	(0.431)	(0.358)	(0.255)
Expenditure elasticity	0.081*	-0.109*	0.102***	0.083*	0.076	0.288***
	(0.042)	(0.058)	(0.027)	(0.050)	(0.069)	(0.036)
Average sectoral productivity	0.015	0.017	0.043**	0.001	0.013	0.027
	(0.041)	(0.021)	(0.017)	(0.027)	(0.027)	(0.017)
Returns to scale	-0.232	0.015	-0.139	-0.210	-0.013	-0.162*
	(0.145)	(0.143)	(0.115)	(0.156)	(0.173)	(0.087)
R^2	0.004	0.002	0.009	0.002	0.002	0.015
N	56,485	53,978	54,242	47,579	53,950	54,212

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Columns 1-3 employ capital elasticities computed with Olley and Pakey (1996) method. Columns 4-6 employ the expenditure elasticity from Comin, Lashkari, Mestiere (2018). Source: APEH.

◄ Return

Robustness: Balanced Panel 1995-2008

	Δ Value Added (1)	Δ Capital (2)	Δ Employment (3)
Capital elasticity	0.665*	1.121***	0.376
	(0.368)	(0.375)	(0.353)
Expenditure elasticity	0.094*	-0.037	0.107***
	(0.048)	(0.052)	(0.038)
Average sectoral productivity	0.024	0.027	0.060***
	(0.028)	(0.023)	(0.021)
Returns to scale	-0.287*	-0.024	-0.097
	(0.159)	(0.155)	(0.133)
R^2	0.004	0.003	0.006
N	20,936	20,936	20,936

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at four-digit sector level. Source: APEH.

◂ Return

Robustness: Top 30 in Net entry

Activity	Broad sector (II digits)	Sector (IV digits)	Description	Income elasticity	Net entry per year	Number of employees	Share agg. employment (in %)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Service	Real estate activities	7012	Buying and selling of own real estate	2.02	982	2	0.08
Service	Construction	4521	General construction of buildings and civil engineering works	0.89	505	3	0.21
Service	Hotels and restaurants	5530	Restaurants	1.80	480	3	0.13
Service	Other business activities	7414	Business and management consultancy activities	1.35	446	2	0.08
Service	Other business activities	7487	Other business activities n.e.c.	1.35	439	3	0.10
Service	Retail trade	5248	Other retail sale in specialized stores	0.83	420	2	0.06
Service	Land transport	6024	Freight transport by road	2.02	404	3	0.08
Service	Other business activities	7420	Architectural and engineering activities and related technical consultancy	1.35	363	2	0.06
Service	Real estate activities	7020	Letting of own property	2.02	297	4	0.03
Service	Retail trade	5211	Retail sale in non-specialized stores with food, beverages or tobacco predominating	0.83	271	4	0.11
Service	Sale, maintenance and repair of motor vehicles	5010	Sale of motor vehicles	0.85	250	2	0.06
Service	Hotels and restaurants	5540	Bars	1.80	248	2	0.04
Service	Retail trade	5263	Other non-store retail sale	0.83	229	2	0.02
Service	Construction	4531	Installation of electrical wiring and fittings	0.89	212	3	0.05
Service	Other business activities	7411	Legal activities	1.35	211	2	0.04
Service	Retail trade	5242	Retail sale of clothing	0.83	201	2	0.06
Service	Computer and related activities	7222	Other software consultancy and supply	1.35	199	2	0.04
Service	Construction	4533	Plumbing	0.89	197	3	0.04
Service	Sale, maintenance and repair of motor vehicles	5020	Maintenance and repair of motor vehicles	0.85	189	2	0.03
Service	Activities auxiliary to financial inter	6720	Activities auxiliary to insurance and pension funding	1.44	182	1	0.02
Service	Real estate activities	7011	Development and selling of real estate	2.02	176	2	0.01
Service	Other business activities	7460	Investigation and security activities	1.35	170	6	0.11
Service	Other services activities	9302	Hairdressing and other beauty treatment	1.18	151	2	0.02
Service	Retail trade	5246	Retail sale of hardware, paints and glass	0.83	143	2	0.03
Service	Other business activities	7440	Advertising	1.35	141	2	0.03
Service	Recreational, cultural and sporting activities	9262	Other sporting activities	1.79	131	2	0.01
Service	Activities auxiliary to financial inter	6713	Activities auxiliary to financial intermediation n.e.c.	1.44	123	2	0.01
Service	Computer and related activities	7220	Software consultancy and supply	1.35	121	2	0.03
Service	Other business activities	7470	Industrial cleaning	1.35	121	7	0.08
Service	Construction	4544	Painting and glazing	0.89	112	2	0.03
Total					8109		1.68

Robustness: Imports

	Δ Value Added	Δ Capital	Δ Employment
	(1)	(2)	(3)
Capital elasticity	0.564*	1.005***	0.352
	(0.339)	(0.365)	(0.283)
Expenditure elasticity	0.082**	-0.087	0.122***
	(0.041)	(0.063)	(0.034)
Imports	0.011***	0.004	0.016***
	(0.003)	(0.003)	(0.002)
Average sectoral productivity	0.012	0.022	0.048***
	(0.036)	(0.022)	(0.018)
Returns to scale	-0.113	0.065	-0.035
	(0.139)	(0.156)	(0.112)
R^2	0.004	0.002	0.011
N	55,928	53,535	53,278

Notes: *, **, *** significant at 10, 5, and 1 percent. Std. errors are clustered at the firm-level. Source: APEH.

◂ Return

Household

→ **Optimal demands**

$$C_{S,t} = \left(\frac{P_{S,t}}{P_t}\right)^{-\eta}\theta_S C_t^{eS} \quad \text{and} \quad C_{M,t} = \left(\frac{P_{M,t}}{P_t}\right)^{-\eta}\theta_M C_t^{eM},$$

$$C_{M,t}^D = \left(\frac{P_{M,t}^D}{P_{Mt}}\right)^{-\eta_M}\theta_D C_{Mt} \quad \text{and} \quad C_{M,t}^F = \left(\frac{1}{P_{Mt}}\right)^{-\eta_M}\theta_F C_{Mt},$$

→ **Demands for individual varieties**

$$q_{St}^d(\omega) = C_{St}\left(\frac{p_{St}(\omega)}{P_{St}}\right)^{-\sigma} \quad \text{and} \quad q_{Mt}^d(\omega) = C_{Mt}^D\left(\frac{p_{Mt}(\omega)}{P_{Mt}^D}\right)^{-\sigma}$$

→ **Euler equations:**

$$1 = \Lambda_{t,t+1}(1-\delta^k + r_{t+1}^k) \quad \text{and} \quad 1 = \Lambda_{t,t+1}(1+r_{t+1})$$

where $\Lambda_{t,t+1} = \beta\frac{\lambda_{t+1}}{\lambda_t}$ and $\lambda_t = \frac{C_t^{-\gamma}}{P_t}\left[\frac{\varepsilon_M\theta_M^{\frac{1}{\eta}}C_t^{\frac{\varepsilon_M-\eta}{\eta}}C_{Mt}^{\frac{\eta-1}{\eta}}+\varepsilon_S\theta_S^{\frac{1}{\eta}}C_t^{\frac{\varepsilon_S-\eta}{\eta}}C_{St}^{\frac{\eta-1}{\eta}}-\eta}{1-\eta}\right]^{-1}$ ◄ Return

Household

→ **Prices**

$$P_t = \left[\theta_M P_{Mt}^{1-\eta} C_t^{e_M-1} + \theta_S P_{St}^{1-\eta} C_t^{e_S-1}\right]^{\frac{1}{1-\eta}} \quad \text{and} \quad P_{Mt} = \left[\theta_D (P_{Mt}^D)^{1-\eta_M} + \theta_F\right]^{\frac{1}{1-\eta_M}}$$

$$P_{St} = \left[\int_{\omega \in \Omega_t} p_{St}(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}} \quad \text{and} \quad P_{Mt}^D = \left[\int_{\omega \in \Omega_t} p_{Mt}(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}}.$$

Value Functions

$$
\begin{aligned}
V_{St}(\varphi) &= \max\left\{0, \pi^d_{St}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{S,t+1}(\varphi)\right\}, \\
V_{Mt}(\varphi) &= \max\left\{V^d_{Mt}(\varphi), V^x_{Mt}(\varphi)\right\}, \\
V^d_{Mt}(\varphi) &= \max\left\{0, \pi^d_{Mt}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{M,t+1}(\varphi)\right\}, \\
V^x_{Mt}(\varphi) &= \max\left\{0, \pi^d_{Mt}(\varphi) + \pi^x_{Mt}(\varphi) + (1-\delta)\Lambda_{t,t+1}V_{M,t+1}(\varphi)\right\}
\end{aligned}
$$

The operational productivity cut-offs are defined implicitly by :

$$
V_{St}(\varphi^d_{St}) = 0, \quad V^d_{Mt}(\varphi^d_{Mt}) = 0, \quad \pi^x_{Mt}(\varphi^x_{Mt}) = 0
$$

Entry and Distributions

Entry:

$$\int_{\varphi_{jt}^d}^{\infty} V_{jt}(\varphi) g_j(\varphi) d\varphi = \phi_{jt} \left[f_j^e + \xi \left(e^{M_{jt}^e - \overline{M}_j^e} - 1 \right) \right] \qquad j \in \{S, M\}$$

Distributions:

$$M_{j,t+1} \mu_{j,t+1}(\varphi) = \begin{cases} (1-\delta) M_{jt} \mu_{jt}(\varphi) + M_{j,t+1}^e g_j(\varphi) & \text{if} \quad \varphi \geq \varphi_{j,t+1}^d \\ 0 & \text{otherwise} \end{cases}$$

Mass of producers:

$$M_{j,t+1} = (1-\delta) M_{jt} \int_{\varphi_{j,t+1}^d}^{\infty} \mu_{jt}(\varphi) d\varphi + M_{j,t+1}^e \int_{\varphi_{j,t+1}^d}^{\infty} g_j(\varphi) d\varphi$$

Entry and Mass of Firms

- **Free-entry condition:** $\int_{\varphi_{jt}^d}^{\infty} V_{jt}(\varphi) g_j(\varphi) d\varphi = \phi_{jt} \left[f_j^e + \xi \left(e^{M_{jt}^e - \overline{M}_j^e} - 1 \right) \right]$, Entrants draw their productivity from a sector specific distribution $G_j(\varphi)$.

- **Law of motion of the mass of firms:**

  $M_{j,t+1} = (1-\delta) M_{jt} \int_{\varphi_{j,t+1}^d}^{\infty} \mu_{jt}(\varphi) d\varphi + M_{j,t+1}^e \int_{\varphi_{j,t+1}^d}^{\infty} g_j(\varphi) d\varphi.$

- **Distribution of producers :**

$$M_{j,t+1} \mu_{j,t+1}(\varphi) = \begin{cases} (1-\delta) M_{jt} \mu_{jt}(\varphi) + M_{j,t+1}^e g(\varphi) & \text{if} \quad \varphi \geq \varphi_{j,t+1}^d \\ 0 & \text{otherwise} \end{cases}$$

Equilibrium

- Labor market:

$$\overline{L} = L_{eM,t} + L_{dM,t} + L_{xM,t} + L_{eS,t} + L_{dS,t}$$

- Capital market:

$$K_t = K_{eM,t} + K_{dM,t} + K_{xM,t} + K_{eS,t} + K_{dS,t}$$

- Goods market:

$$P_{M,t}^D C_{M,t}^D = P_{M,t}^D Q_{dM,t}^D \qquad \text{and} \qquad P_{S,t} C_{S,t} = P_{S,t} Q_{S,t}$$

- Balance of Payments

$$CA_t = B_{t+1} - B_t = TB_t + (r_t - \tau)B_t$$

Externally-Calibrated Parameters

Parameter	Description	Value	Source
r^*	World interest rate	0.04	Macro Data
β	Discount Rate	0.95	Literature
γ	Risk aversion	2	Corsetti, Dedola and Leduc (2008)
η	Substitution C_M-C_S	0.50	Comin, Lashkari, Mestiere (2018)
η_M	Substitution C_M^D-C_M^F	0.85	Corsetti, Dedola and Leduc (2008)
σ	Substitution M varieties	3.8	Ghironi and Melitz (2005)
δ^k	Depreciation of capital	0.12	Macro Data
δ_S	Exogenous exit rate M	0.11	Micro data
δ_M	Exogenous exit rate S	0.08	Micro data
α_S	Capital Share S Sector	0.30	Micro data
α_M	Capital Share M Sector	0.36	Micro data
f_S^e	Fixed entry cost S	1	normalization
f_M^e	Fixed entry cost M	1	normalization
ξ	Variable entry cost	2	small
μ_S	Mean prod dist S	0	normalization
A	Foreign demand for M	1	normalization
τ	Capital control tax	0	na

Where does the decrease in the long-term level of capital come from?

- Compare the terminal level of capital for three economies:
  - (1) 2 sectors with representative firms and exogenous pricing of M good.
  - (2) 2 sectors with representative firms and endogenous pricing of M good.
  - (3) 2 sectors with heterogeneous firms and endogenous pricing of M goods.

- Across different values of capital and expenditure elasticities (12 combinations).

	Representative Firm with Exogenous P_M	Representative Firm with Endogenous P_M	Heterogeneous Firms with Endogenous P_M
	(1)	(2)	(3)
(i) Same α and e	1.000 (neoclassical)		
(ii) Same α and Het. e			
(iii) Same e and Het. α			
(iv) Het. α and Het. e			0.963 (benchmark)

Permanent Effects of Financial Liberalization: Lower Level of Capital

$\rightarrow$ **Where Does the Decrease in the Long-Term Level of Capital Comes from?**

(1) Differences in capital and expenditure elasticities affect marginally.

$\rightarrow$ higher α generates small Rybczynski effect, e has negligible effect.

	Representative Firms with Exogenous P_M	Representative Firms with Endogenous P_M	Heterogeneous Firms with Endogenous P_M
	(1)	(2)	(3)
(i) Same α and e	1.000 (neoclassical)		
(ii) Same α and Het. e	1.000		
(iii) Same e and Het. α	1.007		
(iv) Het. α and Het. e	1.009		0.963 (benchmark)

Permanent Effects of Financial Liberalization: Lower Level of Capital

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(2) Lower in the long-term capital stems from <u>endogenous pricing of M good</u>.

	Representative Firms with Exogenous P_M	Representative Firms with Endogenous P_M	Heterogeneous Firms with Endogenous P_M
	(1)	(2)	(3)
(i) Same α and e	1.000 (neoclassical)	0.911	
(ii) Same α and Het. e	1.000	0.913	
(iii) Same e and Het. α	1.007	0.914	
(iv) Het. α and Het. e	1.009	0.913	0.963 (benchmark)

Permanent Effects of Financial Liberalization: Lower Level of Capital

→ **Where Does the Decrease in the Long-Term Level of Capital Comes from?**

(1) Differences in capital and expenditure elasticities affect marginally.

    → higher α generates small Rybczynski effect, e has negligible effect.

(2) Lower in the long-term capital stems from <u>endogenous pricing of M good</u>.

(3) Heterogeneous model alleviates part of the price effect (less firms, less varieties).

	Representative Firms with Exogenous P_M	Representative Firms with Endogenous P_M	Heterogeneous Firms with Endogenous P_M
	(1)	(2)	(3)
(i) Same α and e	1.000 (neoclassical)	0.911	0.956
(ii) Same α and Het. e	1.000	0.913	0.956
(iii) Same e and Het. α	1.007	0.914	0.965
(iv) Het. α and Het. e	1.009	0.913	0.963 (benchmark)

Optimal Policy for Hungary

Consider gradual financial liberalization (reduction τ given by ϕ)

- lower speed of convergence $\rightarrow$ lower adjustment of P & higher K in long-term.

- Trade slower convergence for higher capital in long-term.

- Gradual reduction in τ given by ϕ : $\tau_t = \max\left\{\left(1 - \left(\frac{2t}{T}\right)^\phi\right) \cdot \bar{\tau}, 0\right\}$.
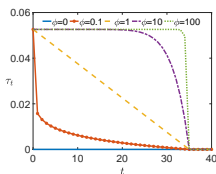
a) Borrowing Tax Schedule
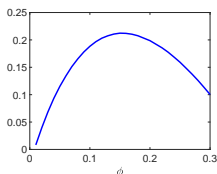
b) CEQ Welfare
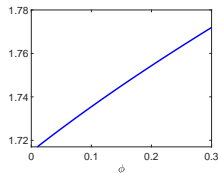
c) Long-Run Capital Level
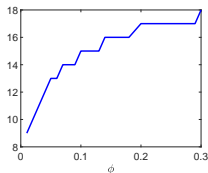
d) Half Life C Convergence

Welfare Comparisons
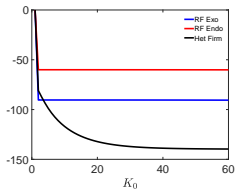
a) NFA/GDP (B/Y) (transition)
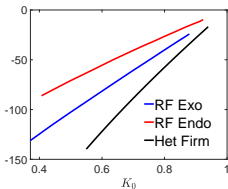
b) NFA/GDP (B/Y)
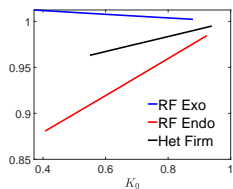
c) Capital
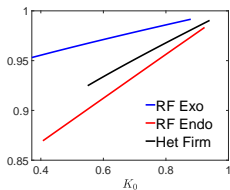
d) Price Level ($\approx 1/RER$)
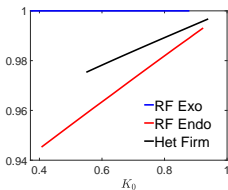
e) Price of Manufacturing
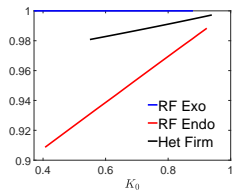
f) Price of Services

Counterfactual Economies

Two exercises to assess the contribution of the input-cost & consumption channels:

1. Same capital intensity across sectors: $\alpha_M = \alpha_S = 0.33$ (consumption channel).

2. Same expenditure elasticity across sectors: $e_M = e_S = 1.01$ (input-cost channel).

Adjust $\bar{L}$ such that $Y = 1$ in open steady state.

Counterfactual: Short Run Transition

- Each line is the difference (%) between autarky and liberalized path.
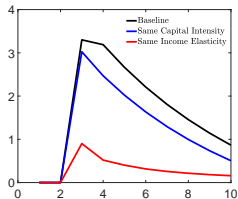
a) Consumption Share of Services
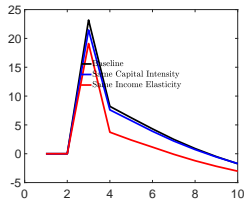
b) Production Share of Services
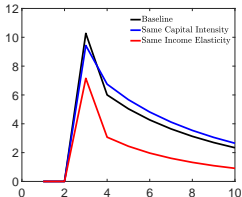
c) Relative Entry Rate (S/M)
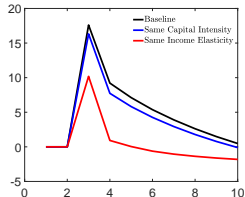
d) Price Index (P)

→ *Consumption channel is key for inter-sectoral reallocation*

Trade and Capital Flows

$\rightarrow$ **Trade balance:**

$$TB_t = \underbrace{X_{M,t}}_{\text{Exports}} - \underbrace{C_{Mt}^F - (K_{t+1} - (1-\delta^k)K_t)}_{\text{Imports}}$$

$\rightarrow$ **Capital Controls**

- Household can issue a foreign bond B, but pays a per unit tax τ.

- Domestic interest rate:

$$r_t = r^* + \underbrace{\tau\{B_t < 0\}}_{\text{Capital controls}} + \underbrace{\tilde{\psi}(B_t)}_{\text{Risk premium}}$$

Financial Liberalization Experiment

- **Financial autarky**: economy transitioning to the steady state.

  - Capital controls high enough: $\underbrace{r_0^k - \delta^k}_{\text{net capital return}} < \underbrace{r^* + \tau}_{\text{Cost of Borrowing}} \rightarrow B_0 = 0.$

- **Financial liberalization**:

  - Unexpected decrease of capital controls: $\tau = 0$.
  - 60% of capital with respect to the financial autarky steady state.

Relative Input-Cost and Consumption Channels in the Short Term

-Liberalization in $t = 3 \to$ decrease in interest rate and start borrowing.
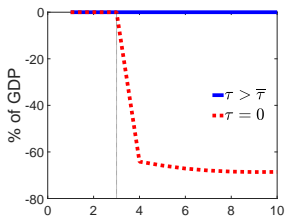
a) NFA to GDP Ratio (B/Y)
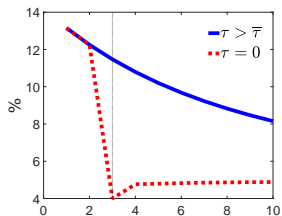
b) Domestic Interest Rate
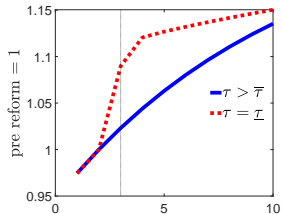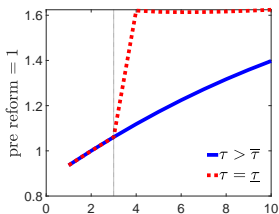
Reallocation across Sectors in the Short Term
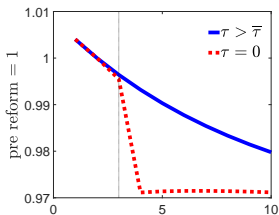
a) Relative Cost Ratio (ϕ_M/ϕ_S)
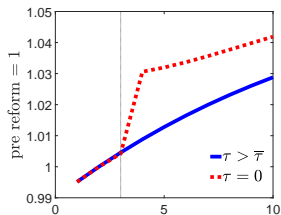
b) Relative Price (P_S/P_M^D)
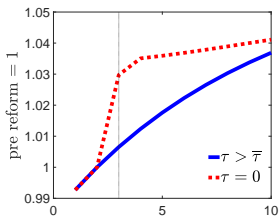
c) Consumption Share of Services
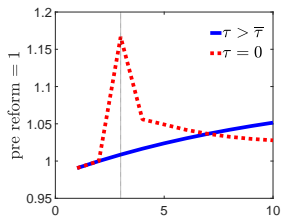
d) Production Share of Services

Reallocation within Sectors in the Short Term
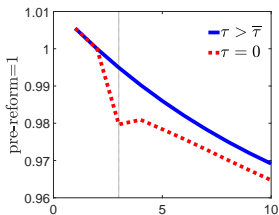
a) Relative Domestic Cut-off (φ_S^d/φ_M^d)
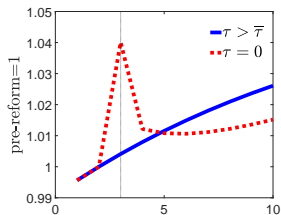
b) Relative Entry Rate (S/M)
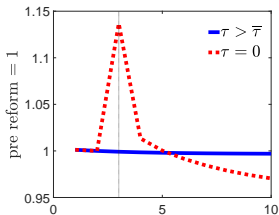
c) Relative Cut-offs within Manufacturing (φ_M^x/φ_M^d)
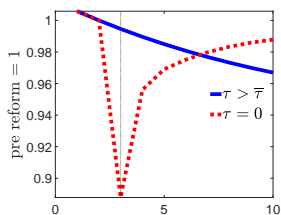
d) Aggregate TFP

Financial Openness (τ) and Long-Term Debt

- In any period with financial openness

$$\underbrace{r_{t+1}^k - \delta^k}_{\text{(net) capital return}} = \underbrace{r^* + \tau + \tilde{\psi}(B_{t+1})}_{\text{cost of international borrowing}}$$

- In open economy steady state, a given τ_{ss} determines B_{ss}:

$$\frac{1}{\beta} - 1 = r^* + \tau_{ss} + \tilde{\psi}(B_{ss})$$

- **Two terminal cases for τ:**
    1. *Partial financial openness:* find $\underline{\tau}_{ss}$ such that $B_{ss} = 0$

    $$\frac{1}{\beta} - 1 = r^* + \underline{\tau}_{ss}$$

    2. *Full financial openness:* let $\tau_{ss} = 0$

    $$\frac{1}{\beta} - 1 = r^* + \tilde{\psi}(B_{ss})$$

$\rightarrow$ The level of financial openness (τ) determines B_{ss} and, thus, the characteristics of the long term steady state.

Small versus Large Reforms
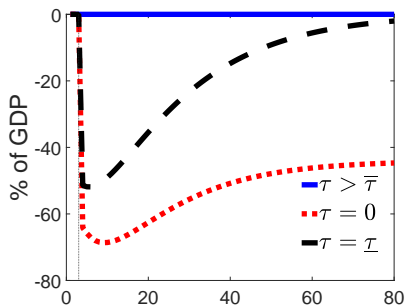
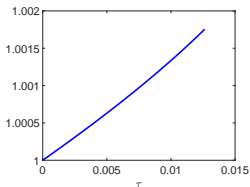a) Foreign Debt to GDP (B/Y)

Financial Autarky; **Partial Financial Openness ($B_{ss} = 0$)**; **Full Openness ($\tau = 0$)**

Comparison of Long-Run Steady States with Different Levels of τ
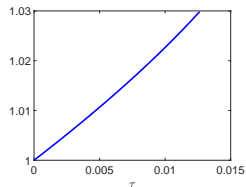
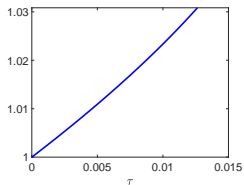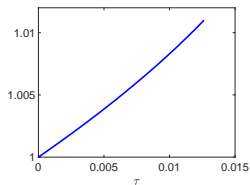**more open ($\tau = 0$) $\rightarrow$ less open ($\tau > 0$).**
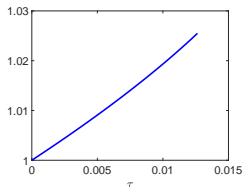
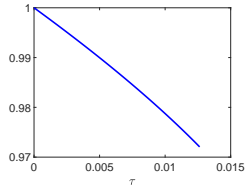a) Consumption

b) Consumption Share of Services

c) Production Share of Services

d) Relative Mass of Firms (M_S/M_M)

e) Price Index ($\approx 1/RER$)

f) Aggregate TFP