

Macroeconomics: Economic Growth (Licence 3)

Lesson 11: Growth and Trade

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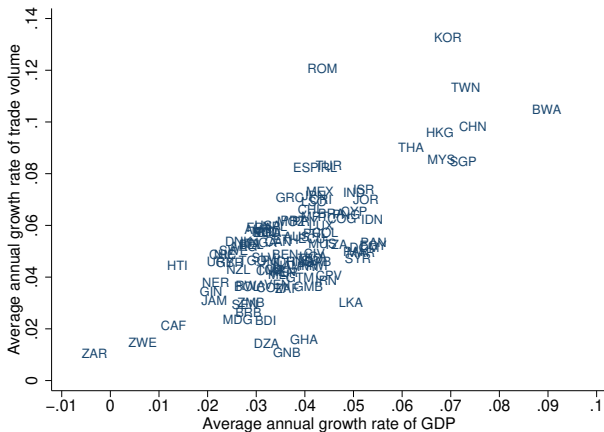
Acknowledges: some slides and figures are taken or adapted from the supplemental resources to the textbook "Introduction to Economic Growth" by Charles I. Jones and Dietrich Vollrath, Third Edition, Norton W.W. Company Inc.

Lesson 11

- **Growth in output and growth in the volume of international trade are closely related.**
 - Growth in trade is associated with growth in output, but not necessarily level of trade (Japan does not actually trade much, but is rich)
 - Rapid growth in trade is no necessarily just growth in exports from East Asia (China and Korea also import a lot more than they used to)
 - **The role of export and import in fostering economic growth**

Economic Growth and Trade

Growth in Trade and Growth in Output



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- **Different channels through which trade affects productivity and growth**
 - (1) The role of Multinational Firms: FDI spillovers
 - (2) Trade liberalization; Lower import barriers

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- **Reducing import barriers (tariffs) affect firm productivity through different channels**
 - (1) Foreign competition
 - (2) Imported input channel

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- (1) **The role of Multinational Firms: FDI spillovers**
 - Foreign affiliates of MNF are more performant use high technology than domestic firms
 - Foreign affiliates premia
 - Domestic firms might benefit from the presence of foreign affiliates

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FDI spillovers

- Keller and Yeaple, (2009), Multinational Enterprises, International Trade, and Productivity Growth: Firm- Level Evidence from the United States, Review of Economics and Statistics, 2009, 91(4): 821-831.

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FDI spillovers

- Keller and Yeaple, (2009), Multinational Enterprises, International Trade, and Productivity Growth: Firm- Level Evidence from the United States, Review of Economics and Statistics, 2009, 91(4): 821-831.
- Estimate international technology spillovers to U.S. manufacturing firms **via imports and foreign direct investment (FDI)** between the years of 1987 and 1996
- The effect of foreign affiliates on domestic firms productivity
- **Horizontal spillovers**

Contribution

- First to show that multinationals can cause economically important productivity benefits to domestically-owned firms

FDI spillovers

- Estimate FDI spillovers depending on sector and domestic firm characteristics :
- High-technology vs. Low-technology sectors
- Small vs. larger domestic firms

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Main mechanisms

- FDI Spillovers: positive externalities of MNF affiliates in host countries
- Import Spillovers: externalities associated with imports activity.

Main mechanisms FDI Spillovers

- MNF are more productive and to do more R&D than purely domestic firms, and the knowledge transferred from parent to its foreign affiliates may spillover to host country firms.
- Host country firms may also obtain access to foreign knowledge by hiring away the employees of the foreign affiliates of multinationals. (pool of highly skilled technicians)
- Vertical linkages and the provision of specialized inputs

Main mechanisms Imports Spillovers

- Imports in the same industry: foreign competition channel
- Imported inputs channel (not considered)

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Main results

- FDI leads to substantial productivity gains for domestic firms
- FDI spillovers are particularly strong in **high-tech sectors**, whereas they are largely absent in low-tech sectors
- **Small firms with low productivity benefit more** from FDI spillovers than larger and more productivity firms.
- The evidence for import spillovers is much weaker.

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Data

- Unbalanced sample of manufacturing firms in the United States from Standard and Poor Compustat database
- Publicly traded companies and publishes data from the companies' balance sheets according to legal reporting requirements
- Matched with data at the industry level (50 industries) in which the U.S. Bureau of Economic Analysis (BEA), responsible for reporting U.S. FDI data, is classifying total manufacturing activity
- Estimation strategy: exploit industry variation

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- Empirical strategy
- Identifying FDI and import spillovers
- First difference estimation of domestic firms' TFP changes in the presence of MNF and imports at the industry level:
- $\Delta TFP_{ijt} = \gamma_1 \Delta FDI_{jt} + \gamma_2 \Delta Imp_{jt} + \epsilon_{ijt}$
- FDI_{jt} the share of the foreign-owned affiliates' employment (denoted f) in foreign affiliates employment plus employment of U.S.-owned firms (denoted by e) by industry j to which firm i belongs
- Imp_{jt} the share of U.S. imports (denoted m) in imports plus total shipments (denoted d) of the industry to which the firm belongs

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Table 4: OLS Results With One-, Two-, and Three-year Differences

	(4.1)	(4.2) Δ^2	(4.3) Δ^3
R&D	0.001 (0.001)	0.003 (0.002)	0.005 (0.003)
Cap. Utilization	-0.030 (0.057)	-0.067 (0.075)	-0.163 (0.316)
Mkt Share	-0.089 (0.102)	-0.292 (0.210)	-0.269 (0.316)
Firm Mark-up	-0.009 (0.004)	-0.005 (0.005)	-0.089 (0.041)
Industry Mark-up	0.367 (0.177)	0.998 (0.417)	1.034 (0.453)
FDI			
Current	0.213 (0.122)	0.379 (0.196)	0.411 (0.233)
Lagged One	0.303 (0.112)		
Lagged Two	-0.049 (0.097)		
Imports			
Current	0.480 (0.407)	0.341 (0.480)	0.210 (0.392)
Lagged One	0.754 (0.323)		
Lagged Two	-0.236 (0.291)		
F-test FDI	4.58 (0.033)		
F-test Imports	2.20 (0.139)		
Obs	5,895	3,175	2,226
R-squared	0.110	0.169	0.217

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- Quantification
- FDI spillovers account for between 8 % and 19% of US manufacturing productivity growth during 1987-96.
- Which factors drive FDI spillovers?

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Table 8: FDI Spillovers in High-Technology versus Low-Technology Industries

	(8.1) Hi-Tech; Δ	(8.2) Low-Tech; Δ	(8.3) Hi-Tech; Δ^2	(8.4) Low-Tech; Δ^2
R&D	0.003 (0.002)	0.000 (0.001)	0.005 (0.003)	0.000 (0.002)
Cap. Utilization	0.051 (0.068)	-0.083 (0.048)	-0.020 (0.114)	-0.007 (0.075)
Mkt Share	0.282 (0.286)	-0.139 (0.111)	-0.019 (0.618)	-0.318 (0.222)
Firm Mark-up	-0.016 (0.003)	-0.004 (0.001)	0.030 (0.076)	-0.008 (0.003)
Industry Mark-up	0.831 (0.220)	0.058 (0.079)	1.403 (0.409)	0.388 (0.153)
FDI				
Current	0.257 (0.173)	-0.012 (0.098)	0.680 (0.390)	0.133 (0.153)
Lagged One	0.412 (0.202)	0.173 (0.107)		
Lagged Two	0.241 (0.225)	-0.135 (0.085)		
Imports				
Current	0.185 (0.487)	0.175 (0.161)	-0.340 (0.901)	0.235 (0.158)
Lagged One	0.738 (0.541)	0.318 (0.144)		
Lagged Two	-1.415 (0.773)	-0.101 (0.146)		
F-test FDI	5.23 (0.026)	0.00 (0.972)		
F-test Imports	0.170 (0.683)	1.87 (0.173)		
Obs	2,794	3,101	1,506	1,669
R-squared	0.133	0.048	0.208	0.068

Figures in parentheses are standard errors clustered by industry-year combination. The null hypothesis of the F-test is that the sum of coefficients equals zero.

Import barriers I

- Import barriers are tariffs set by Governments on foreign goods.
- There are two different import barriers:
 - (1) Import barriers on final consumption goods (output tariffs)
 - (2) Import barriers on intermediate goods (input tariffs) used in the production of final goods.

Import barriers I

- How do reductions on import barriers on final goods affect firm performance?

Trade liberalization and economic growth

The impact of reductions on import tariffs on final goods on firms' performance

- The reduction of import barriers on final goods increases Foreign Competition (FC) in the domestic market:
- FC reduces market shares of domestic firms
- Least productive firms should exit the market
- What happens with aggregate productivity?

Trade liberalization and economic growth

Aggregate productivity?

- (1) **Selection effect:** Exit of least productive firms due to foreign competition ;
- (2) **Within firm productivity improvement:** FC generates pressures on domestic firms that stay in the market to innovate/ upgrade technology and quality

Import barriers II

- How do reductions on import barriers on intermediate goods (input tariffs) affect firm productivity?

Trade liberalization and economic growth

The impact of reductions on import tariffs on intermediate goods on firms' performance

- (1) **Foreign technology transfer:**
- If firms import intermediate goods with embodied advanced technologies from abroad,
- They can increase their productivity.
- They can produce more units of output with the same amount of production factors.

The impact of reductions on import tariffs on intermediate goods on firms' performance

- (2) **Variety effect:**
- International trade increases the variety of intermediate goods available in a country
- Firms might import new varieties of intermediate goods that are not available in the domestic market.
- – > allowing them to increase its efficiency in the production process.

The impact of reductions on import tariffs on intermediate goods on firms' performance

- (3) **Quality channel:**
- Access to high quality inputs from abroad
- This channel is stronger for developing countries that might access to intermediate goods of higher quality produced by developed economies.

The impact of reductions on import tariffs on intermediate goods on firms' performance

- (4) **Cost effect:**
- Firms can import cheaper intermediate goods from other countries,
- Sourcing intermediate goods from abroad produced with lower production costs allows firms to decrease their marginal costs.

Intermediate Inputs and Productivity: Evidence from Indonesia

- Amiti, M. and Konings, J. "Trade Liberalization, Intermediate Inputs, and Productivity". American Economic Review, December vol. 97(05) December 2007, pp.1611-1638.

- **Aim**
 - To estimate the effects of trade liberalization (both output and input tariffs cut) on within-firm productivity.

- **Contribution**
 - First work to disentangle the productivity gains that arise from reducing tariffs on final goods from those that arise from reducing tariffs on intermediate inputs.

Indonesia foreign competition vs. foreign technology

Data

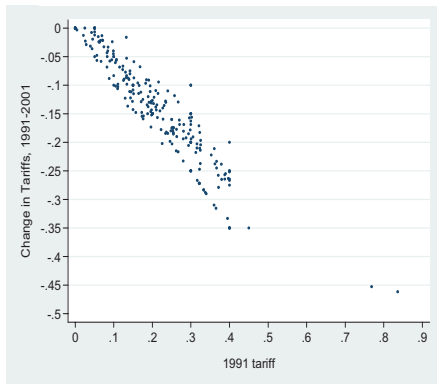
- They use Indonesian manufacturing census data from 1991 to 2001, which includes plant level information on imported inputs.
- Each census comprises information on output, employment, ownership, exports, and imports.

Identification strategy 1: Output tariffs changes

- In the early 90s, the Indonesian government starts a unilateral trade liberalization policy
- Import tariffs were highly reduced
- Tariff cuts were heterogeneous across sectors
- Identification: relies on changes in tariffs across sectors over time.

Indonesia foreign competition vs. foreign technology

Figure 2. Change in Tariffs, 1991-2001, Relative to Initial Levels



Note: Industries that experienced an increase in their tariff over the sample period are excluded from the figure. These are industries 31161, 31169, 31310, and 31320.

Input tariffs changes

- The input tariffs are constructed as a weighted average of the output tariffs, where the weights are based on cost shares using IO tables.
- For example, if an industry uses 70 percent steel and 30 percent rubber, the input tariff for that industry is equal to 70 percent of the steel tariff plus 30 percent of the rubber tariff.

Econometric specification

- The impact of input and output tariffs variations on firms' TFP:

- $$tfp_{it} = \gamma_0 + \alpha_i + \alpha_{It} + \gamma_1 Output - tariffs_{st} + \gamma_2 Input - tariffs_{st} + \gamma_3 Input - tariffs_{st} \times FM_{it} + \gamma_4 FM_{it} + \gamma_5 Z_{it} + \epsilon_{it}$$

- Z control variables:

- FM_{it} a firm-level indicator of importing firms which equals 1 if the firm imports inputs.
- Exit indicator
- Exporter dummy, FX, is equal to one for firms that export any of their output
- Foreign dummy, FF, is equal to one if foreign ownership is greater than ten percent.

Econometric specification

- The impact of input and output tariffs variations on firms' TFP:
- $\gamma_1 < 0$ as the increase in import competition is likely to force firms to search for ways to improve their productivity
- $\gamma_2 < 0$ and $\gamma_3 < 0$ access to foreign inputs increase firm efficiency

Indonesia foreign competition vs. foreign technology

Main results

- (1) The impact of input tariffs reductions on companies productivity or efficiency:
- The results show that a 10 percentage point fall in input tariffs leads to a productivity gain of 12 percent for firms that import their inputs

Main results

- (2) The impact of output (final goods) tariffs reductions on companies productivity or efficiency:
- The effect is twice lower for output tariffs
- A 10 percentage point fall in final goods tariffs leads to 5 percent increase in productivity gains

Main Results

Table 4: Basic Results

Dependent variable: $\ln(TFP_{it})$						
	(1)	(2)	(3)	(4)	(5)	(6)
Output tariff _{it}	-0.206*** (0.033)	-0.070* (0.042)	-0.092** (0.043)	-0.096** (0.043)	-0.096** (0.043)	-0.095** (0.043)
Input tariff _{it}		-0.441*** (0.062)	-0.318*** (0.063)	-0.315*** (0.063)	-0.315*** (0.063)	-0.325*** (0.063)
Input tariff _{it} x FM _{it}			-0.914*** (0.086)	-0.899*** (0.086)	-0.896*** (0.086)	
FM _{it} =1 if import share >0			0.092*** (0.012)	0.091*** (0.012)	0.089*** (0.012)	
Input tariff _{it} x import share _{it}						-1.908*** (0.164)
Import share _{it}						0.233*** (0.024)
FX _{it} =1 if export share >0					-0.010** (0.005)	
Export share _{it}						-0.008 (0.006)
FF _{it} =1 if foreign share ≥0.1					0.070*** (0.017)	
Foreign share _{it}						0.079*** (0.023)
Exit _{it} =1 if firm exits in t+1				-0.040*** (0.004)	-0.040*** (0.004)	-0.040*** (0.004)
Island x year effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes
Observations	170,741	170,741	170,741	170,741	170,741	170,741
R-squared	0.80	0.80	0.80	0.80	0.80	0.80

Economic Growth and Trade

- **Trade and Growth: determinant or cause?**
 - How does productivity affect exports ?
 - Are firms able to increase productivity growth thanks to international trade ?

Selection effect vs. learning by exporting

- The causality could run both ways:
- (1) Only more productive firms become exporters
- (2) Exporting activities improve firm efficiency ex-post

Selection effect vs. learning by exporting

- **Learning by exporting:**
- Exporters are able to benefit from **linkages created in the foreign market** with suppliers as well as acquire specific knowledge on competitors abroad.
- At the same time, exporters benefit from their knowledge of the foreign market to adopt more advanced technologies in the case of developing countries.
- The literature has found evidence of self selection into the export market of most productive firms,
- There is some evidence of learning by exporting depending on the country of analysis