

REASSESSING THE PRODUCTIVITY GAINS FROM TRADE AND FDI LIBERALIZATION: AN INDUSTRY-LEVEL APPROACH:



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IMF-WB-WTO Joint Trade Workshop
June 29, 2015

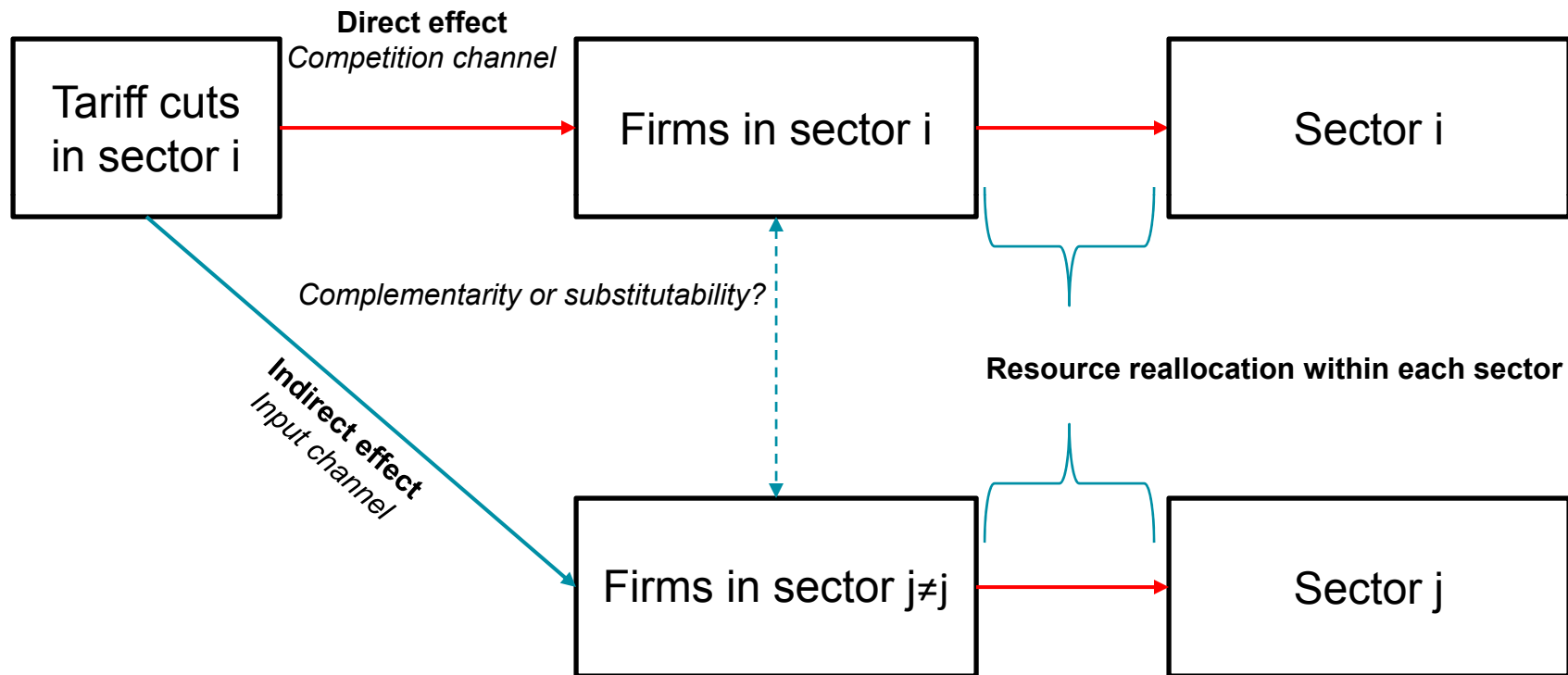
WHY...AGAIN?

- Trade and FDI liberalization:
 - Essential component of country and global policy agendas
 - Welfare gains
 - Productivity gains
- Challenges in quantifying gains from trade:
 - Various channels
 - Cross-country as well as cross-sector heterogeneity
 - Interaction with structural factors
- This paper aims to tackle those challenges in country-sector-year set-up
 - with a particular focus on the role of resource reallocation

PREVIOUS THEORETICAL STUDIES

- Firm-level productivity gains from trade liberalization
 - Pro-competition channel
 - Scale economies (Helpman and Krugman, 1985)
 - Innovation incentives (Aghion et al, 2005)
 - cf. Rodrik (1988, 1991)
 - Input variety channel
 - Kasahara and Rodrigue, 2008; Gopinath and Neiman, 2014; Halpern, Koren, and Szeidl, 2015
 - Technological spillover channel
- Industry-level productivity gains from trade
 - Resource reallocation within a sector across firms (e.g., Melitz, 2003)
 - Backward and forward linkages (e.g., Rodriguez-claire, 1996)

PRODUCTIVITY GAINS FROM TRADE LIBERALIZATION



- Firm-level TFP gains via output and input market channels will be amplified by the resource reallocation process within each sector

PREVIOUS EMPIRICAL FINDINGS

○ Country-level studies

- Sachs and Warner (1995, BPEA); Frankel and Romer (1999, AER); Wacziarg and Welch (2008, WBER), etc.
- Carefully controlling endogeneity issues
- Difficult to identify specific channels

○ Firm-level studies

- Amiti and Konings (2007, AER); Fernandes (2007, JIE); Topalova and Khandelwal (2011, ReStat)
 - Indonesia; Colombia; India
- Separately identify output and input market effects
- Limited analysis of the role of resource reallocation

CONTRIBUTION

- Building a unique, comprehensive database of tariff rates
 - Incorporate various types of preferential rates beyond MFN rates
- Estimating output and input market channels separately
 - Study relationship between output and input tariffs
 - Explore interactions with structural factors across countries or country-sectors
- Investigating complementarities between trade and FDI liberalization
 - Tariff and non tariff barriers; Trade in goods and services
- Policy simulations from potential reforms (not today)

PREVIEW OF MAIN FINDINGS

- Dominant input market channels:
 - Complementarity between output and input tariffs
- Stronger effect in more flexible economies:
 - Labor market flexibility
 - Product market regulation
- Complementarity between tariff and FDI regulations:
 - Input (output) market channels stronger as FDI regulations are weaker in input (output) markets

DATA

- Sector-level TFP data from EU KLEMS and World KLEMS
 - 17 countries with up to 18 sectors over 23 years
- Tariff data from TRAINS/WITS
 - Comprehensive tariff information
 - MFN, GSP, RTA, PTA, bilateral preferential rates, etc
- Trade data from UN Comtrade
- Other country- or country-sector level data on the market flexibility
 - Employment Protection Index, Product Market Regulation Index, FDI restrictiveness index (OECD).

TARIFF RATE DATA CONSTRUCTION

- Comprehensive measure at the product level

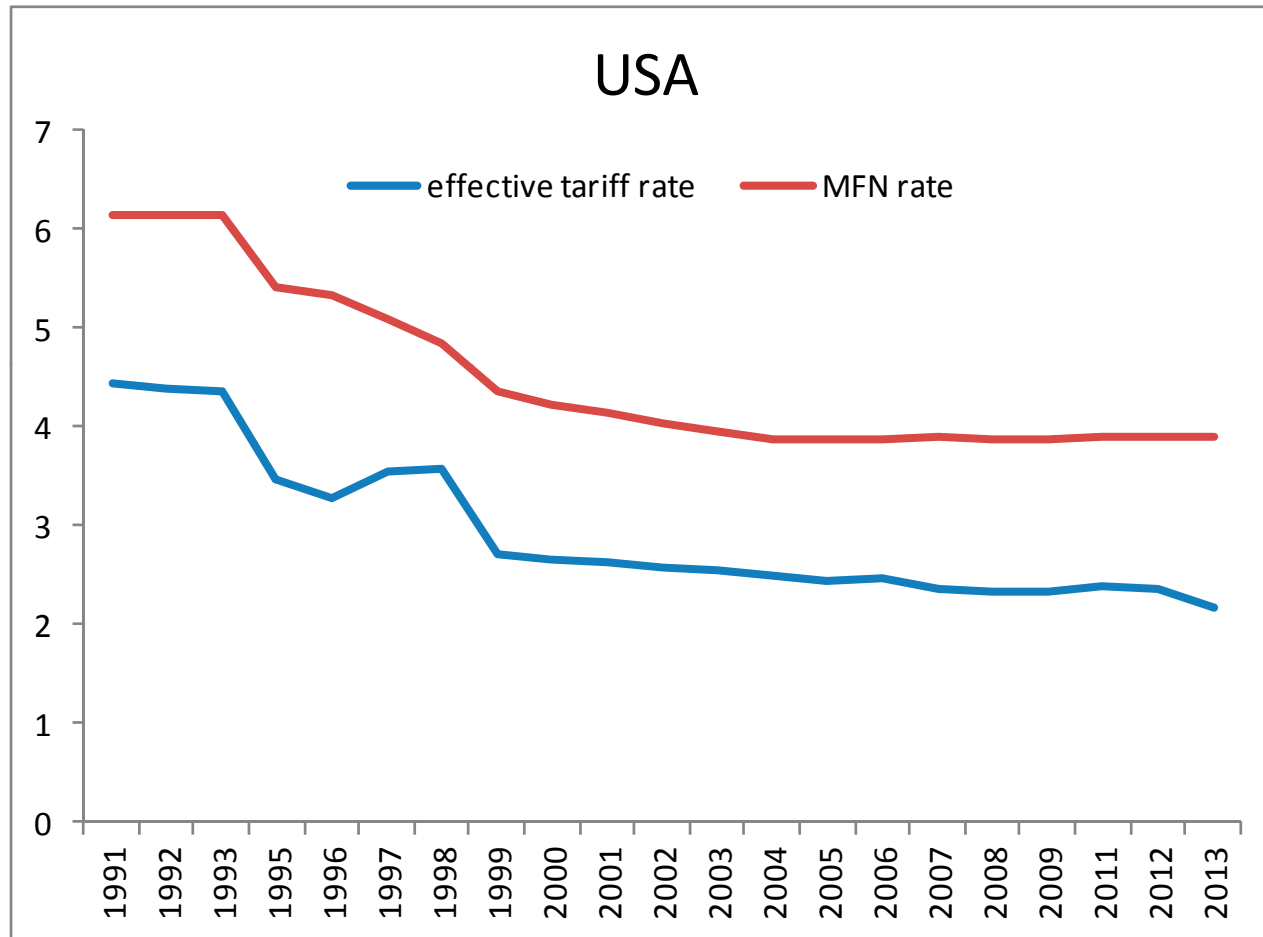
$$\tau_t^{i,g} = \sum_j^{N_t^{\text{MFN}}} w_{ij}^g \text{MFN}_t^{ij,g} + \sum_j^{N_t^{\text{Pref}}} w_{ij}^g \text{PREF}_t^{ij,g} + \sum_j^{N_t^{\text{non-MFN}}} w_{ij}^g \text{NONMFN}_t^{ij,g}$$

- Raw data at HS8-10 level from TRAINS/WITS
- weights from initial year's bilateral HS6 trade data
- Aggregate up to 2 digit ISIC sector level (Output tariff)
 - weights from initial year's aggregate HS6 trade data
- Incorporate IO tables (Input tariff)

$$\tau_{t,\text{input}}^{i,j} = \sum_k \alpha_{jk}^i \tau_{t,\text{output}}^{i,k},$$

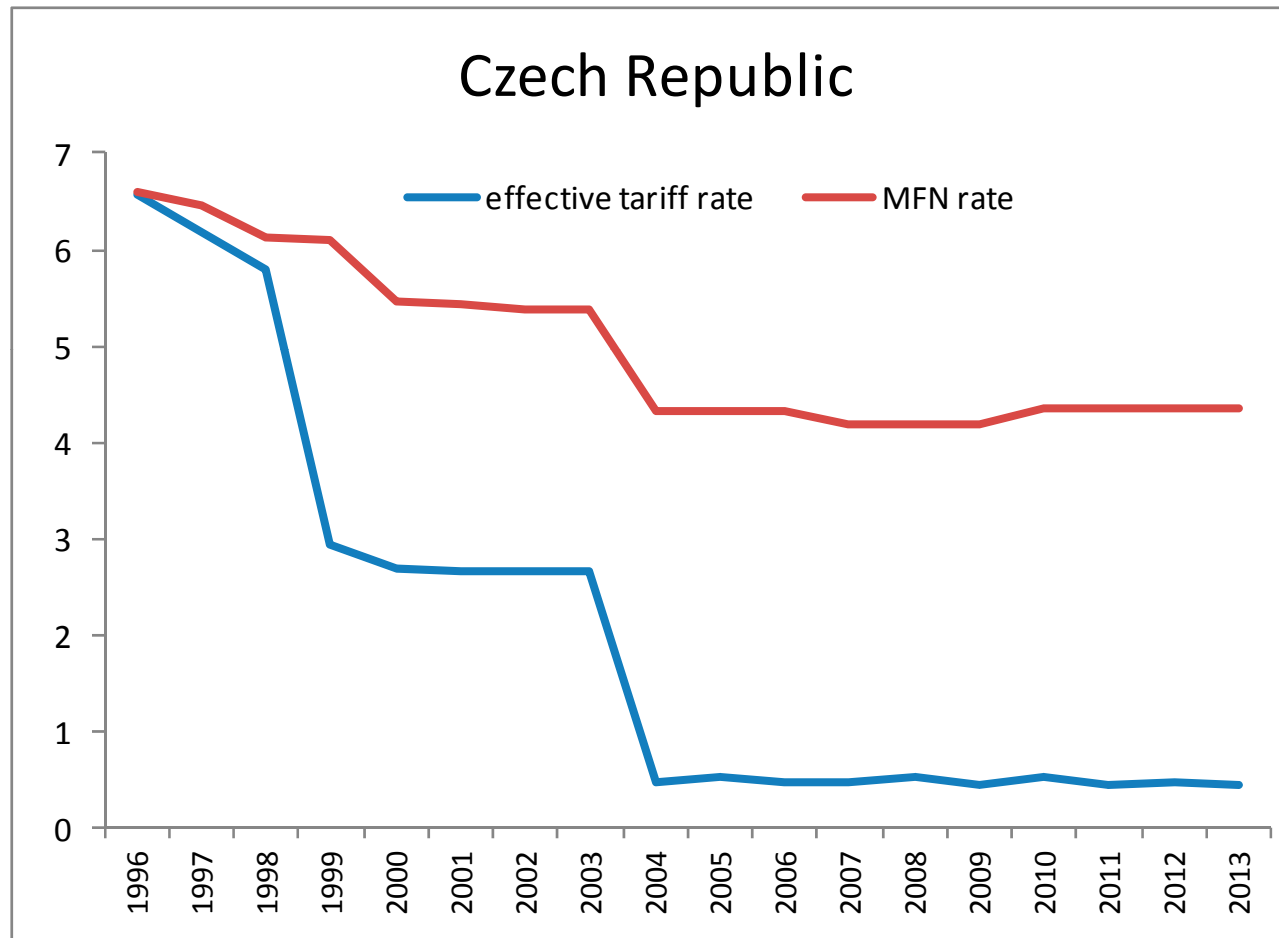
where α_{jk}^i is the share of imported inputs from sector k in total inputs used in sector j

MFN vs EFFECTIVE TARIFF



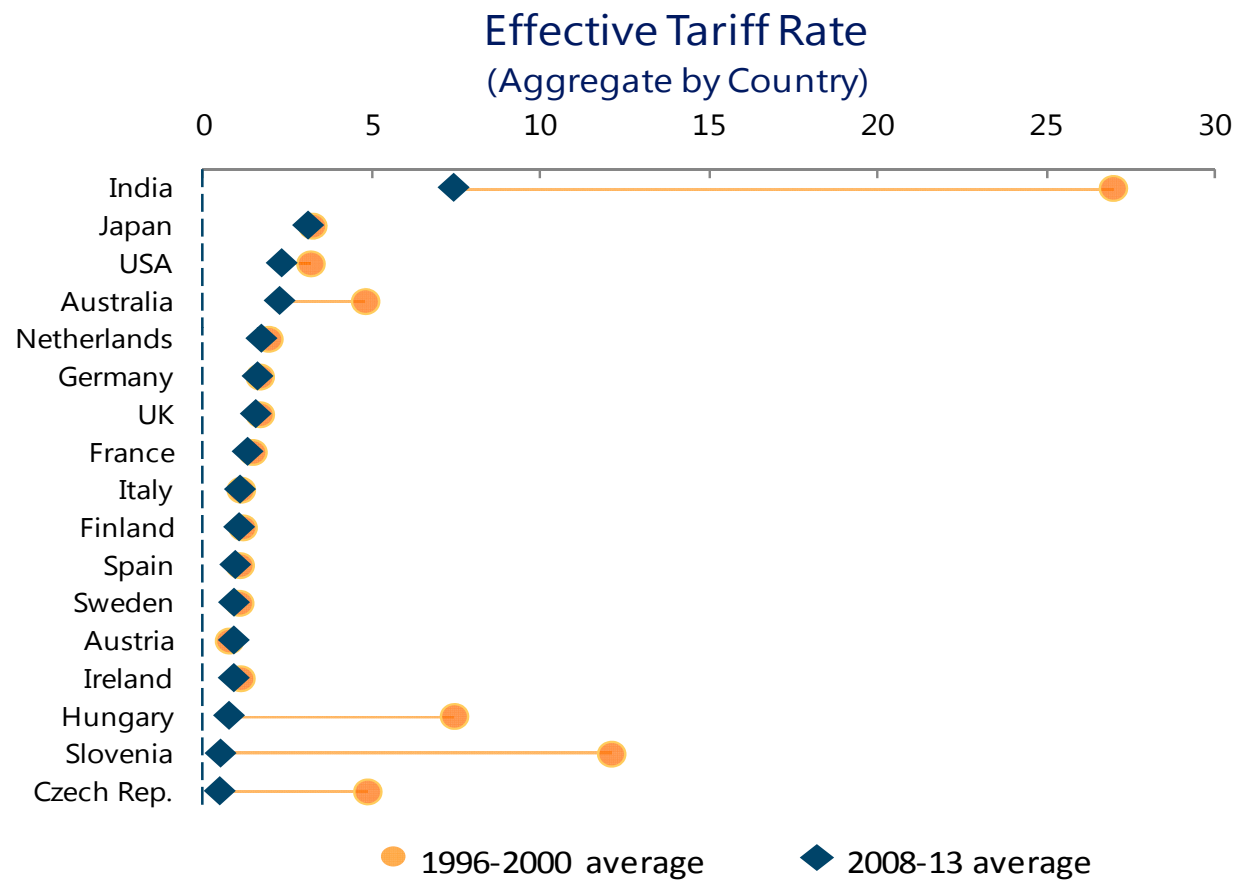
- The effective tariff measure tends to be lower and more volatile than the simple average of MFN rates
 - By accounting for other preferential rates

MFN vs EFFECTIVE TARIFF



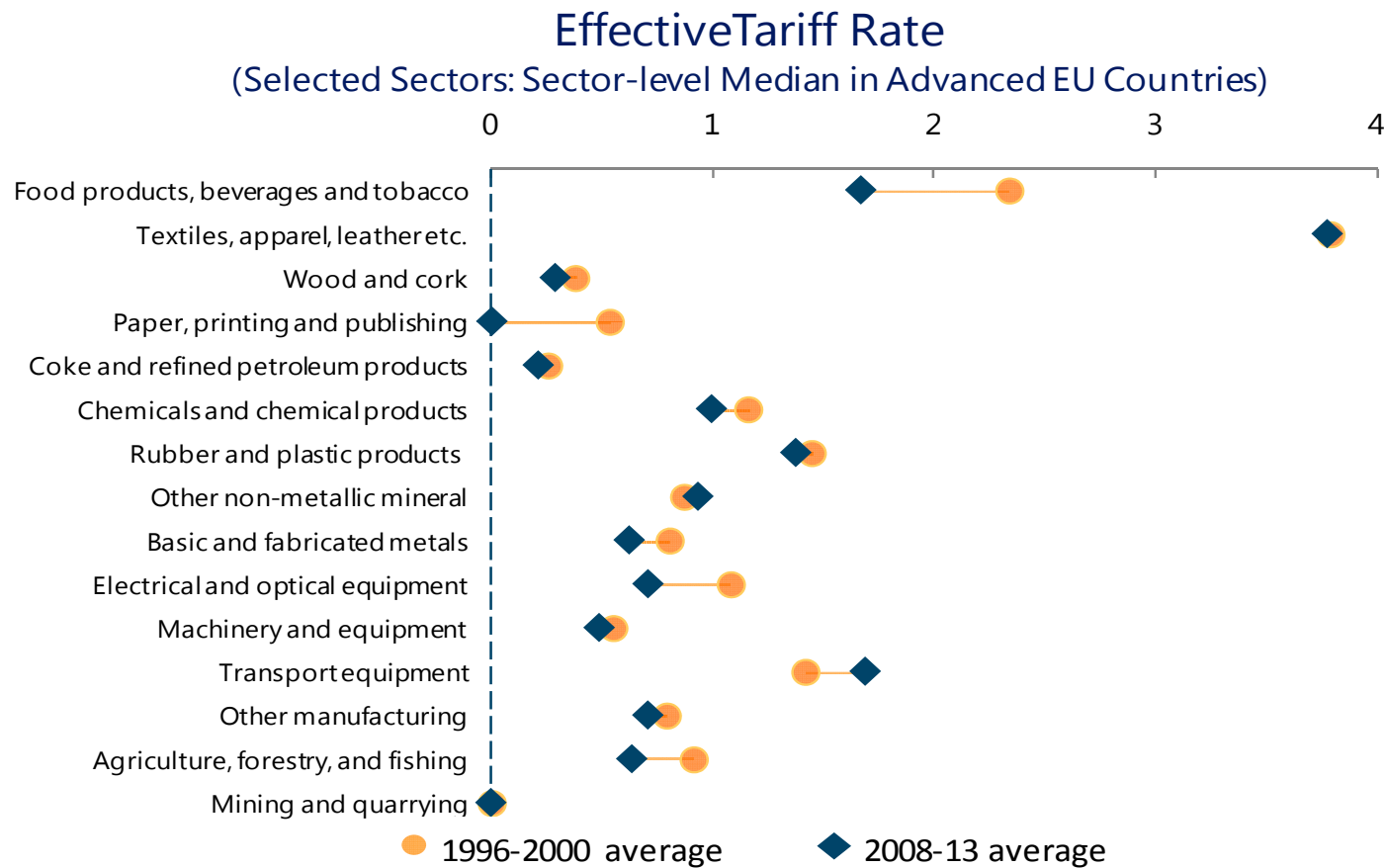
- The effective tariff measure tends to be lower and more volatile than the simple average of MFN rates
 - By accounting for other preferential rates

THE EVOLUTION OF TARIFF RATES



- Relatively little variation among advanced countries
 - Potential issue with country-level study

THE EVOLUTION OF TARIFF RATES



- Substantial variation across sectors even among EU countries
 - Will be exploited along with variation in TFP growth

EMPIRICAL STRATEGY

- Baseline specification

$$\ln TFP_{ist} = \beta EPR_{ist-j} + \gamma InputTariff_{ist-j} + \delta \left(EPR_{ist-j} \times InputTariff_{ist-j} \right) + FE_{is} + FE_{it} + \varepsilon_{ist},$$

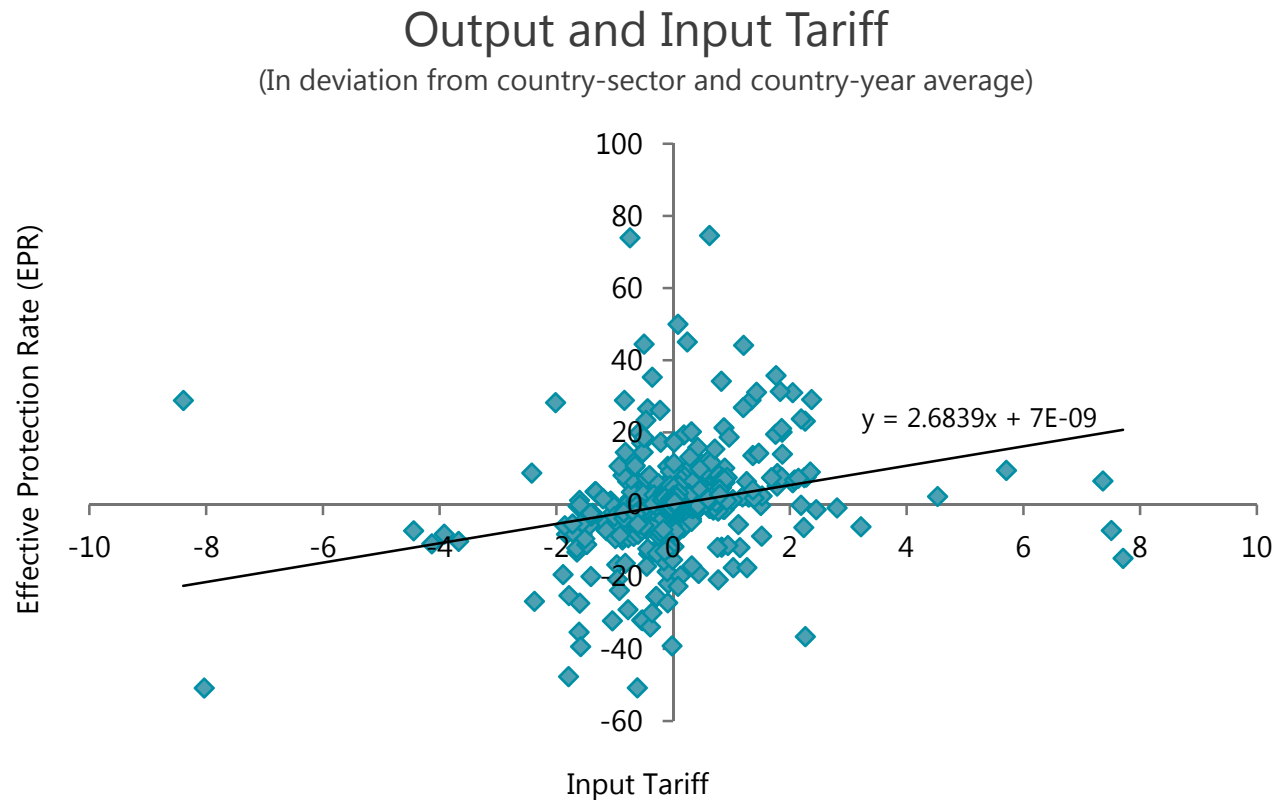
where $EPR = \frac{OutputTariff_{ist-j} - InputTariff_{ist-j}}{1 - (Input / VA)_{is}}$

- Introducing interaction terms with other structural measures

- Identification strategy

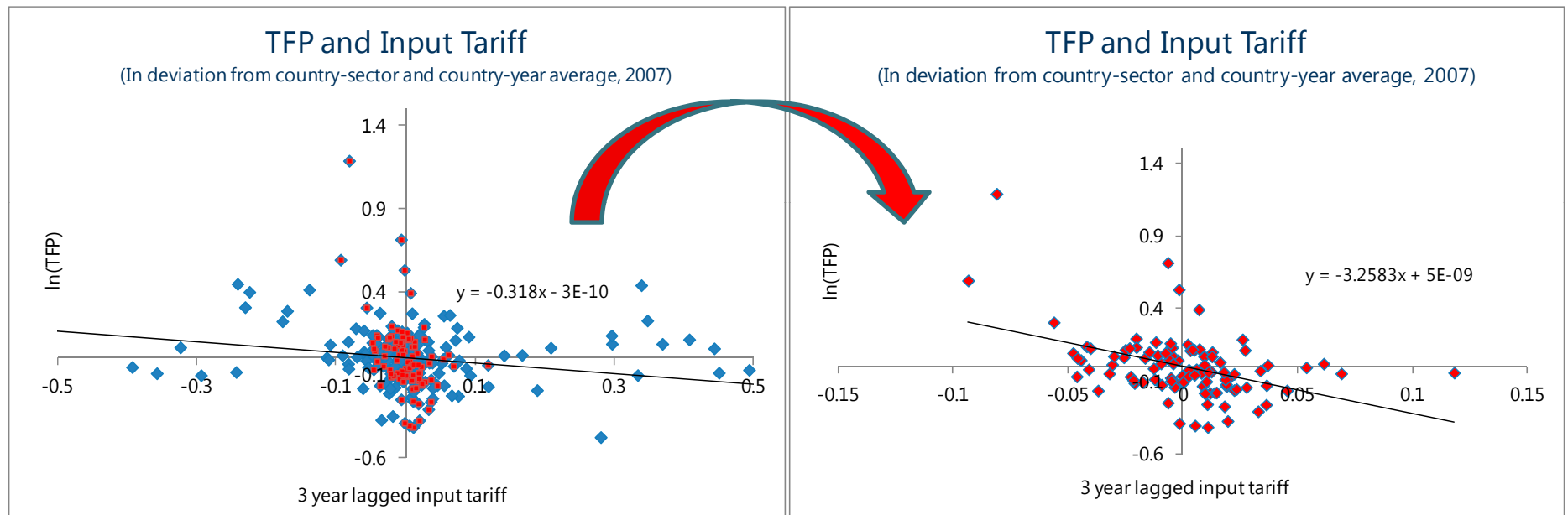
- Aghion et al (2008, AER): state-industry level delicensing in India
 - Productivity effects of delicensing
 - Variation in labor market institutions across states

OUTPUT VS INPUT TARIFF



- Strong correlation between output and input tariff
- But not enough to generate collinearity concerns

TFP AND TARIFF: A SNAP SHOT



- Negative correlation between TFP and Tariff
- Stronger relationship in more flexible labor market countries

REGRESSION: BASELINE WITH COMPLEMENTARITY

Dependent variable:	<i>ln(TFP)_{ist}</i>			
	(1)	(2)	(3)	(4)
	j=1	j=2	j=3	j=4
EP _{Rist-j}	-0.002** (0.001)	-0.002** (0.001)	-0.002* (0.001)	-0.002 (0.001)
Effective Input Tariff _{ist-j}	-0.088*** (0.017)	-0.088*** (0.015)	-0.087*** (0.015)	-0.086*** (0.014)
EP _{Rist-j} × Effective Input Tariff _{ist-j}	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Country-sector FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Obs	3,292	3,044	2,796	2,548
(Adj)R squared	0.651	0.697	0.723	0.751

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- Strong and negative effect of input and output tariffs on TFP
- Dominant input channels; potential complementarity between input and output tariffs

REGRESSION: BASELINE WITH COMPLEMENTARITY

Dependent variable:	<i>ln(TFP)_{ist}</i>			
	(1)	(2)	(3)	(4)
	j=1	j=2	j=3	j=4
EPR _{ist} -j	-0.002** (0.001)	-0.002** (0.001)	-0.002* (0.001)	-0.002 (0.001)
Effective Input Tariff _{ist} -j	-0.088*** (0.017)	-0.088*** (0.015)	-0.087*** (0.015)	-0.086*** (0.014)
EPR _{ist} -j × Effective Input Tariff _{ist} -j	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Country-sector FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Obs	3,292	3,044	2,796	2,548
(Adj)R squared	0.651	0.697	0.723	0.751

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- One s.d decline in effective input tariffs (-1.4%) raises TFP by around 7%, when EPR is at median level (0.6; U.S. electrical equipment)

REGRESSION: BASELINE WITH MFN RATES

Dependent variable:	<i>ln(TFP)_{ist}</i>			
	(1)	(2)	(3)	(4)
	j=1	j=2	j=3	j=4
EPR _{ist-j}	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.002)
Effective Input Tariff _{ist-j}	0.003 (0.020)	0.008 (0.020)	0.014 (0.022)	0.014 (0.022)
EPR _{ist-j} × Effective Input Tariff _{ist-j}	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Country-sector FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Obs	3,292	3,044	2,796	2,548
(Adj)R squared	0.643	0.690	0.717	0.746

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- No such patterns when using simple average of MFN rates

REGRESSION: STRUCTURAL FACTORS

Dependent variable:	<i>ln(TFP)_{ist}</i>			
	(1)	(2)	(3)	(4)
		Rigidity=(EPL) _i	Rigidity=(Severance Pay) _i	Rigidity=(PMR) _i
EPR _{ist} -3	-0.002 * (0.001)	-0.005 *** (0.002)	-0.010 ** (0.004)	-0.005 (0.003)
Effective Input Tariff _{ist} -3	-0.087 *** (0.015)	-0.132 *** (0.027)	-0.190 *** (0.049)	-0.141 *** (0.036)
EPR _{ist} -3 × Effective Input Tariff _{ist} -3	0.001 *** (0.000)	0.003 *** (0.001)	0.005 *** (0.001)	0.003 *** (0.001)
EPR _{ist} -3 × Rigidity		0.004 *** (0.001)	0.006 ** (0.002)	0.003 (0.002)
Effective Input Tariff _{ist} -3 × Rigidity		0.055 ** (0.028)	0.078 ** (0.033)	0.045 * (0.026)
EPR _{ist} -3 × Effective Input Tariff _{ist} -3 × Rigidity		-0.002 *** (0.001)	-0.003 *** (0.001)	-0.002 *** (0.001)
Country-sector FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Obs	2,796	2,796	2,796	2,796
(Adj)R squared	0.723	0.725	0.726	0.724

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- Both channels stronger in more flexible labor or product market economies

REGRESSION: STRUCTURAL FACTORS

Dependent variable:	<i>ln(TFP)_{ist}</i>			
	(1)	(2)	(3)	(4)
		Rigidity=(EPL) _i	Rigidity=(Severance Pay) _i	Rigidity=(PMR) _i
EPR _{ist} -3	-0.002 * (0.001)	-0.005 *** (0.002)	-0.010 ** (0.004)	-0.005 (0.003)
Effective Input Tariff _{ist} -3	-0.087 *** (0.015)	-0.132 *** (0.027)	-0.190 *** (0.049)	-0.141 *** (0.036)
EPR _{ist} -3 × Effective Input Tariff _{ist} -3	0.001 *** (0.000)	0.003 *** (0.001)	0.005 *** (0.001)	0.003 *** (0.001)
EPR _{ist} -3 × Rigidity		0.004 *** (0.001)	0.006 ** (0.002)	0.003 (0.002)
Effective Input Tariff _{ist} -3 × Rigidity		0.055 ** (0.028)	0.078 ** (0.033)	0.045 * (0.026)
EPR _{ist} -3 × Effective Input Tariff _{ist} -3 × Rigidity		-0.002 *** (0.001)	-0.003 *** (0.001)	-0.002 *** (0.001)
Country-sector FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Obs	2,796	2,796	2,796	2,796
(Adj)R squared	0.723	0.725	0.726	0.724

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- Input channel is about twice stronger in U.S. (coeff=-0.23 with EPL=0.26) than in Spain (coeff=-0.10 with EPL=1.63)

REGRESSION: COMPLEMENTARITY WITH FDI POLICY

Dependent variable:	<i>ln(TFP)_{ist}</i>		
	(1)	(2)	(3)
		(Direct FDI Regulation) _{is}	(Indirect FDI Regulation) _{is}
EPR _{ist} -3	-0.002 * (0.001)	-0.003 ** (0.002)	0.000 (0.003)
Effective Input Tariff _{ist} -3	-0.087 *** (0.015)	-0.105 *** (0.022)	-0.102 *** (0.021)
EPR _{ist} -3 × Effective Input Tariff _{ist} -3	0.001 *** (0.000)	0.002 *** (0.000)	0.001 * (0.000)
EPR _{ist} -3 × FDI Regulation		0.021 *** (0.007)	0.009 (0.008)
Effective Input Tariff _{ist} -3 × FDI Regulation		0.285 (0.246)	0.423 * -0.249
EPR _{ist} -3 × Effective Input Tariff _{ist} -3 × FDI Regulation		-0.012 ** (0.005)	-0.004 (0.003)
Country-sector FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Obs	2,796	2,439	2,439
(Adj)R squared	0.723	0.723	0.723

Standard errors in parentheses are clustered at the country-year level . Significance: * 10 percent; ** 5 percent; *** 1 percent.

- Input (output) market channels stronger as FDI regulations are weaker in input (output) markets

INTERIM SUMMARY AND POLICY IMPLICATIONS

- Dominant input market channels:
 - Targeted trade policy design
- Stronger effect in more flexible economies:
 - Structural reforms to maximize gains from trade liberalization
- Complementarity between tariff and FDI regulations:
 - Scrapping non-tariff barriers to maximize gains from trade liberalization

EXTENSIONS

- Country-sector-year varying measures on structural factors
- Extending samples with labor productivity measure
 - Checking robustness with labor productivity
 - Checking (dis)similarity between advanced and emerging market economies
- Accounting for catch-up dynamics
 - Dynamic analysis with sector-level PPP adjustments
 - Can trade policies affect the speed of catch-up?
- Policy simulations
 - Under hypothetical scenarios of potential reforms
 - Advanced back-of-envelope calculations