

# FROM CHINA WITH LOVE

*Very preliminary results*

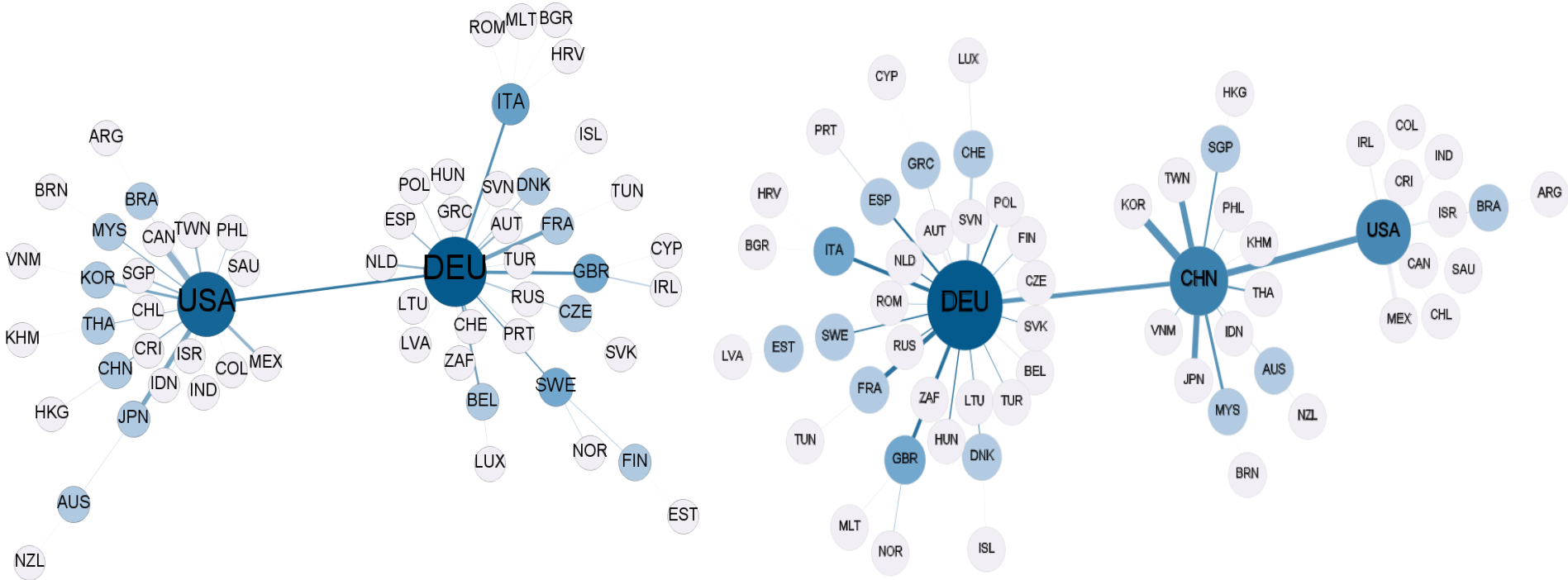
**Mauro Boffa, Gianluca Santoni, and Daria Taglioni**

# MOTIVATION

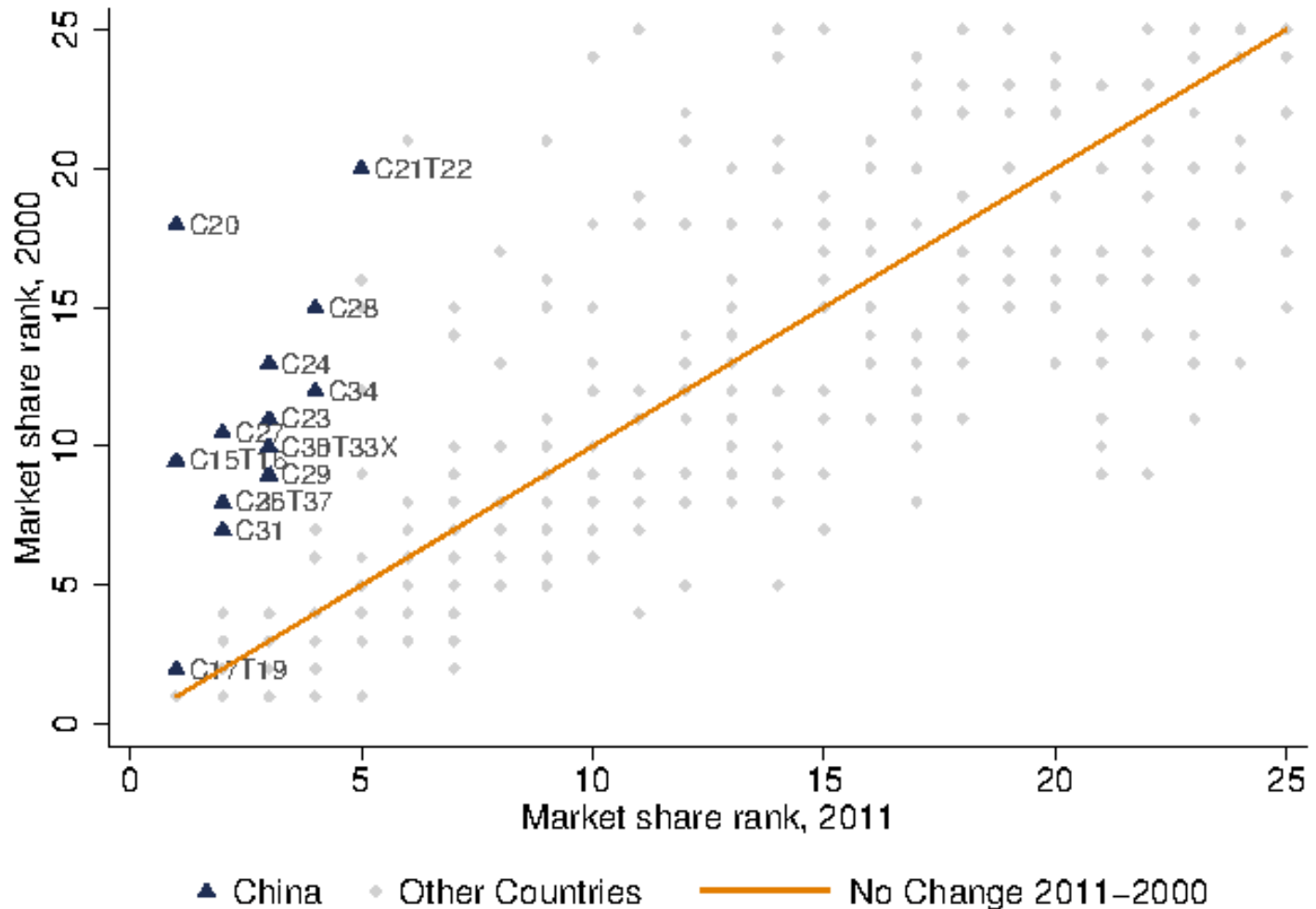
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- China is arguably the poster-child of development through GVC integration.
- Shock waves to the rest of the world and massive transformation over the past two decades.
- What is the impact of increasing imports of Chinese intermediate goods?

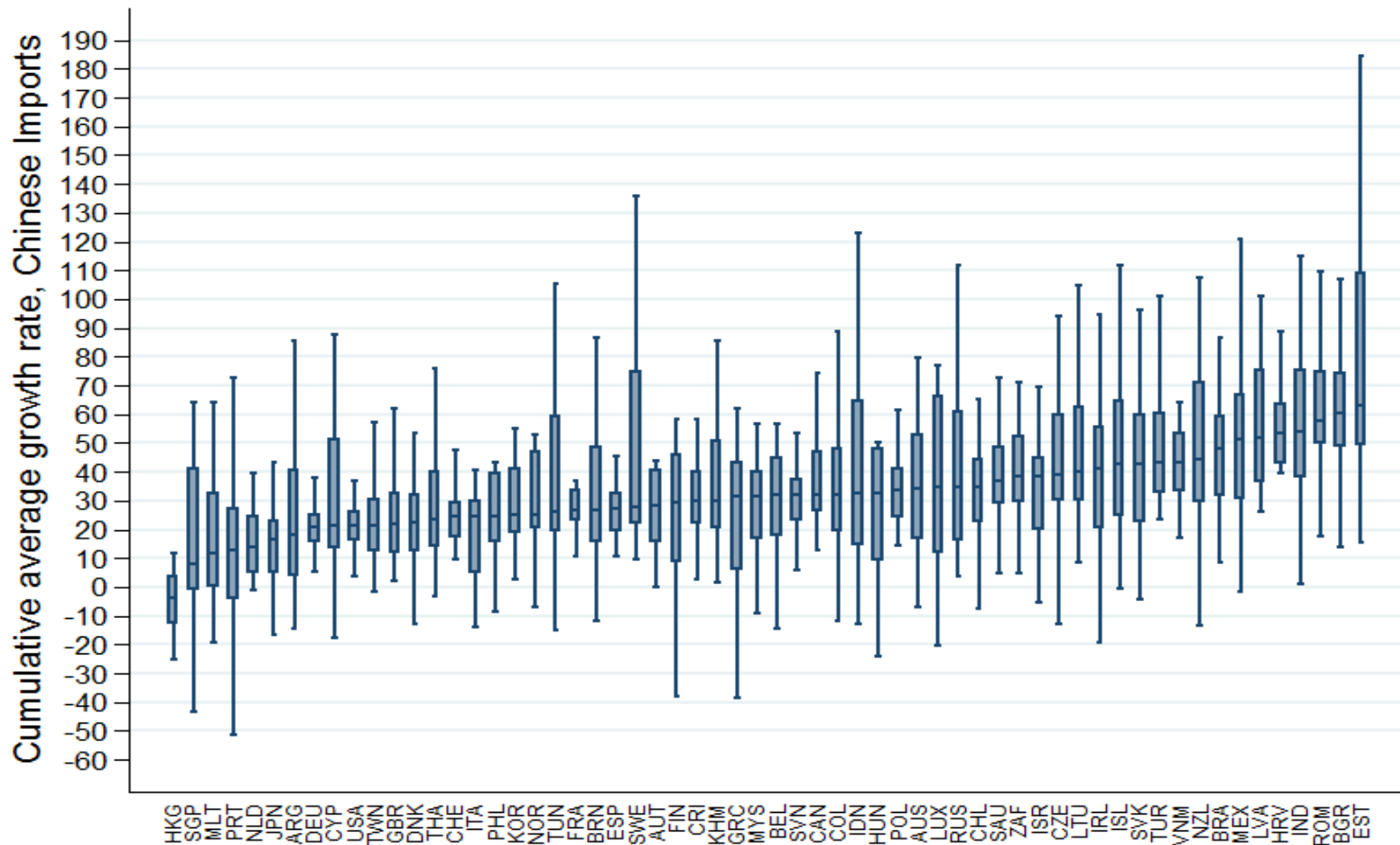
# MOTIVATION



# VALUE ADDED, EXPORT MARKET SHARE – CHINA



# MEDIAN IMPORT PENETRATION



# THIS PAPER

- It asks: is upgrading (and the increase in domestic value added content) in China a threat for other economies or an opportunity?
- It quantifies the impact of China's import penetration of intermediate goods in terms of output (and value added).
- It builds a measure of import penetration that takes into account the economic exposure of specific domestic sectors.
- It finds heterogeneous effects, winners and losers.
- Explores a potential explanation for the results: driven by the degree of complementarity/substitution of domestic production with China's imports.

## RELATED LITERATURE

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- Import competition effects on industry employment: Autor et al. (2013) ; Acemoglu et al. (2016). Negative Effect from Chinese import competition.
- Import competition effects on firm employment, survival, technology & innovation: Bernard et al (2006), Mion and Zhu (2013), Bloom et al (2015); welfare implications of China trade integration, di Giovanni et al (2014).

## RELATED LITERATURE

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- Increase number of production steps performed by Chinese firms over time: Chor et al (2014): captured by the evolution of imported inputs upstreamness over time.
- Increasing Domestic Value Added content of Chinese exports, Kee and Tang (2016): China's domestic content in exports to increase from 65 to 70 percent in 2000-2007 due to the substitution of domestic for imported materials.



# DATA

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- OECD TiVA database, 61 countries, 35 sectors, 1995-2010.
- PENN Tables: TFP growth, capital accumulation, capital per worker.
- Upstreamness, number of stages of production from TiVA following Fally (2012).

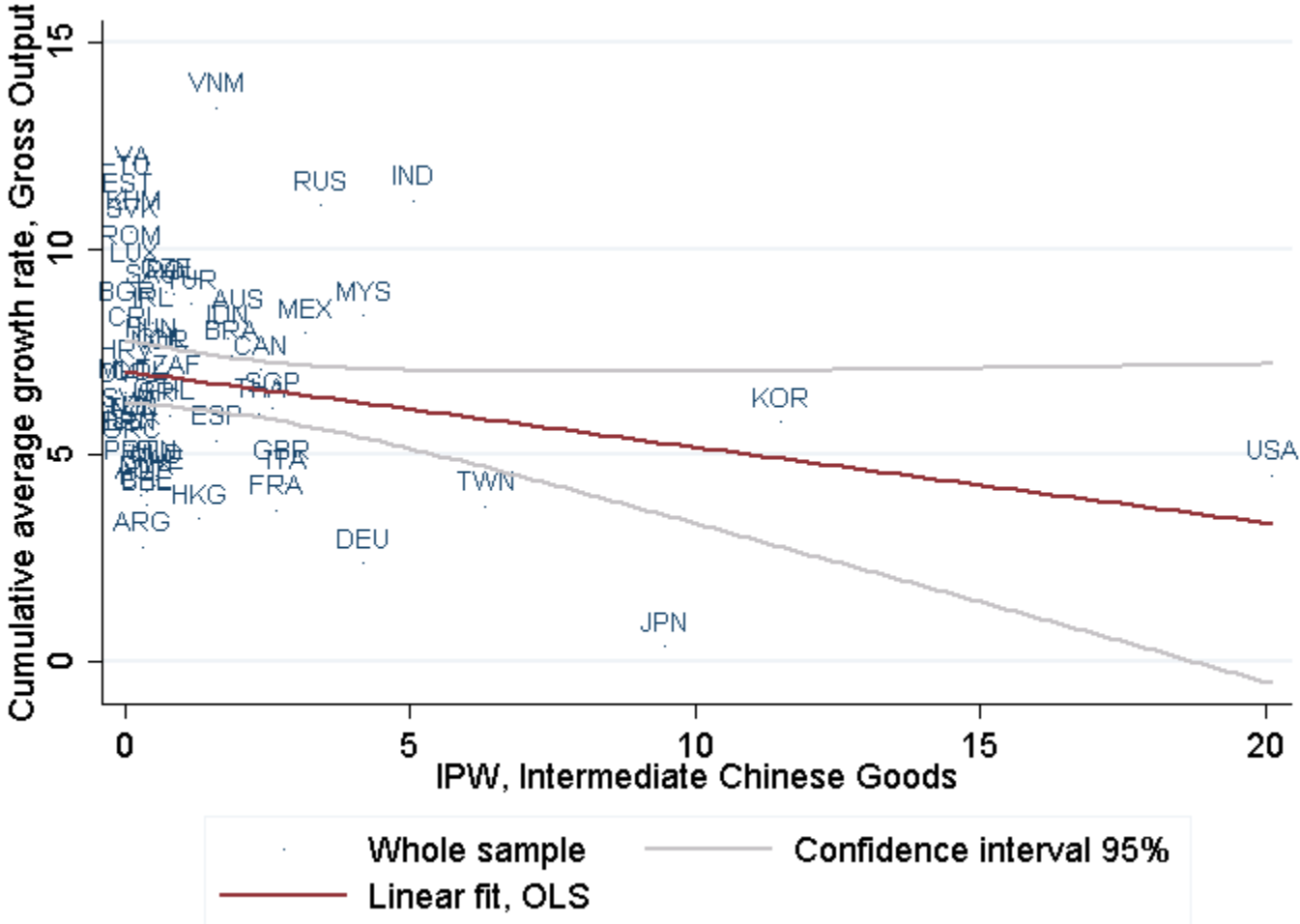
# EMPIRICAL APPROACH

- We adopt an empirical strategy close to the one used by Autor et al (2013) to capture the impact of trade shocks in the United States.
- For country  $i$ , industry  $j$ , import penetration shocks are:

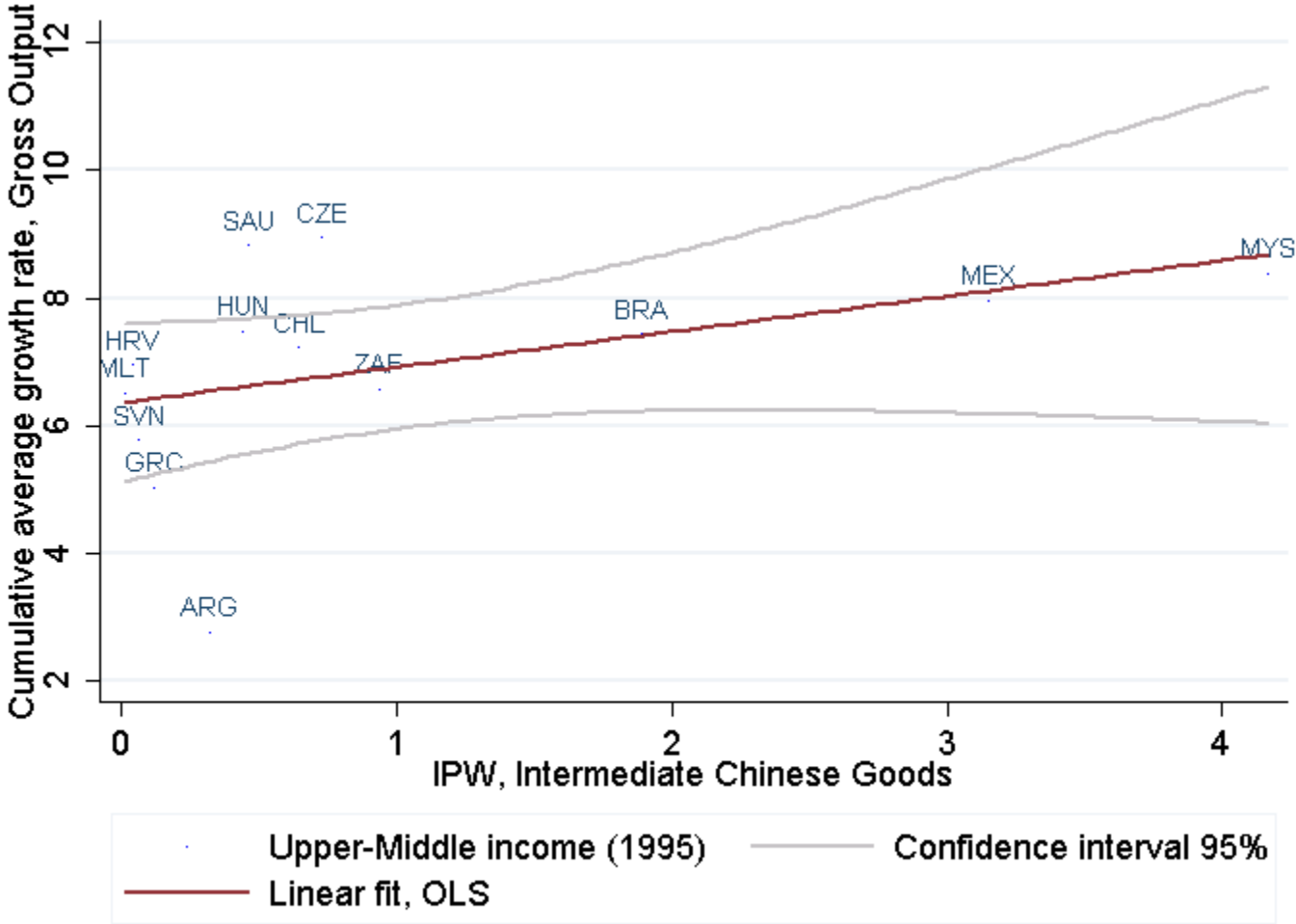
$$\Delta IPW_{i,1995-2010} = \sum_j \frac{Y_{ij,1995}}{Y_{.j,1995}} \frac{\Delta IMPINT_{chn,ij,1995-2010}}{Y_{i,1995}}$$

- $Y$  is either gross production or value added.

# IPW AND GROSS OUTPUT



# IPW AND GROSS OUTPUT: UPPER-MIDDLE INCOME



# EMPIRICAL APPROACH

$$\Delta y_i = \alpha + \beta_1 \Delta IPW_{i,1995-2010} + \Delta \Gamma_i \beta_k + e_i$$

- As dependent variables we use both the growth rate of output and the growth rate value added.
- $\Gamma$  is a vector of control variables: capital per worker, TFP-growth, imports from rest of the World, upstreamness and the number of production stages.
- We allow beta to vary across three income classes.

# IDENTIFICATION

- $\beta_1$  can be subject to endogeneity problems: since country-sector shocks depend on the domestic production structure.
- We propose the average Chinese intermediates import shock in all trade partners (capturing CHN supply factors, ideally not driven by  $ij$  production structure)

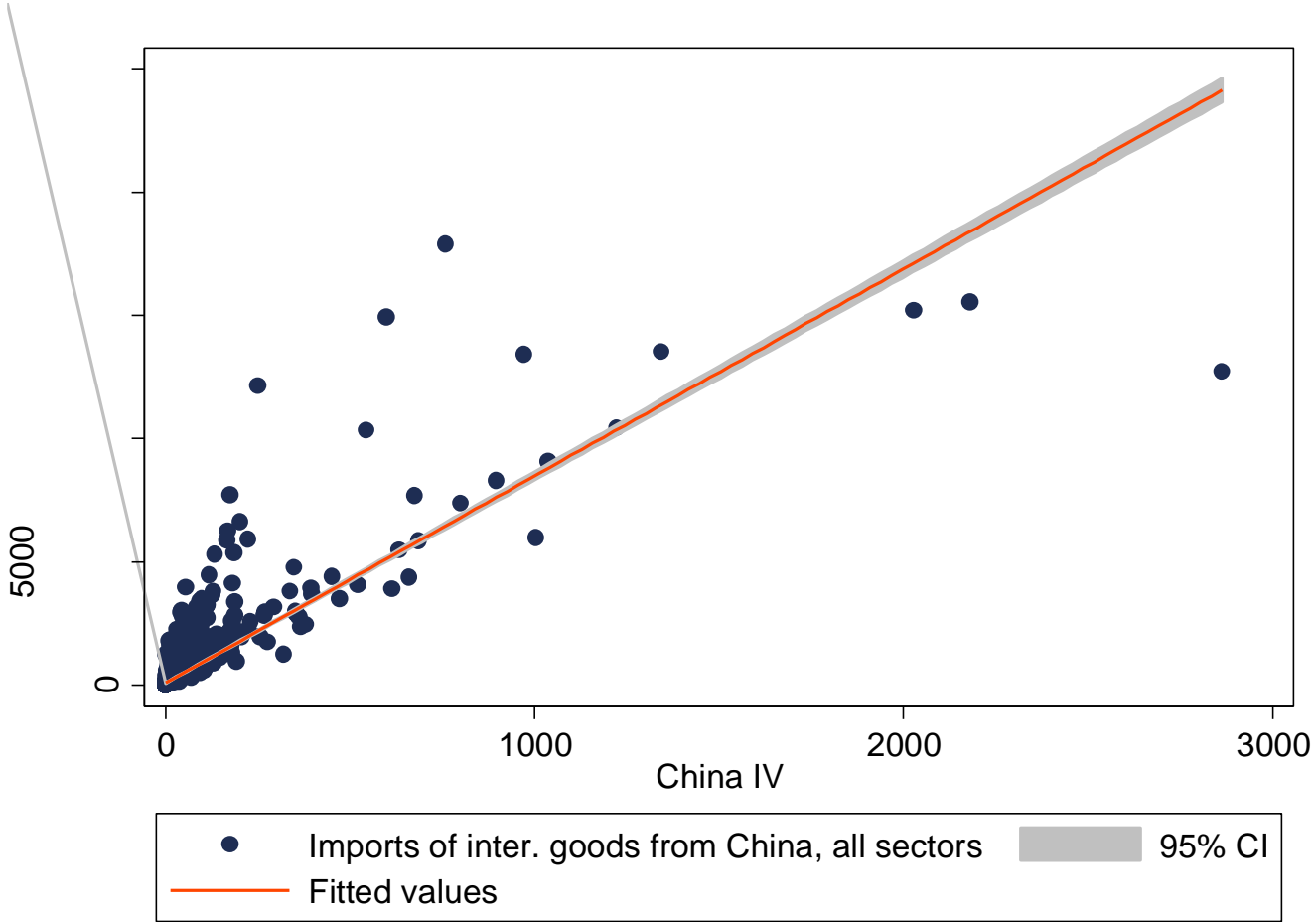
$$\Delta CHN_{ijt}^{IV} = \sum_k^K \hat{w}_{ijkt} * \Delta CHN_{ijkt}^{imp}$$

# IDENTIFICATION

$$\Delta CHN_{ijt}^{IV} = \sum_k^K \hat{w}_{ijkt} * \Delta CHN_{ijkt}^{imp}$$

- For any country-sector  $ij$  we define our IV as the weighted average of import shocks in  $ij$  foreign partners, weighted by inter-country production linkages  $\mathbf{W}$ .
- In order to derive an orthogonal set of weights we employ a gravity-model specification to predict cross-countries intermediates flows based on bilateral exogenous determinants.
- The final instrument is then aggregated at the country level following the IPW formula.

# INSTRUMENT





# BASELINE RESULTS: OLS, GROSS OUTPUT

	(1)	(2)	(3)	(4)	(5)
	Production	Production	Production	Production	Production
IPW	-0.183 ** (0.090)				
IPW * LM Income		1.095 *** (0.262)	0.749 *** (0.234)	0.074 (0.296)	0.081 (0.332)
IPW * UM Income		0.475 *** (0.146)	0.849 *** (0.220)	0.329 *** (0.106)	0.457 ** (0.189)
IPW * H Income		-0.237 ** (0.112)	-0.249 ** (0.109)	-0.151 * (0.082)	-0.119 * (0.069)
Capital per worker			0.502 *** (0.156)	0.110 (0.149)	0.042 (0.147)
TFP-growth			0.859 *** (0.256)	0.388 ** (0.178)	0.325 * (0.162)
Imports, RoW				0.564 *** (0.079)	0.646 *** (0.086)
Upstreamness					1.201 ** (0.455)
Production Stages					-1.938 *** (0.548)
Constant	7.026 *** (0.358)	6.567 *** (0.372)	4.757 *** (0.569)	1.848 *** (0.462)	74.435 (47.082)
Number of observations	60	60	57	57	57
Adj. R-Squared	0.035	0.225	0.469	0.694	0.730

# BASELINE RESULTS: 2SLS, PRODUCTION

	(1)	(2)	(3)	(4)	(5)
	Production	Production	Production	Production	Production
IPW	-0.114 ** (0.053)				
IPW * LM Income		1.022 *** (0.182)	0.766 *** (0.224)	0.049 (0.295)	0.105 (0.340)
IPW * UM Income		0.417 *** (0.147)	0.831 *** (0.207)	0.265 ** (0.129)	0.361 ** (0.166)
IPW * H Income		-0.168 ** (0.074)	-0.164 ** (0.065)	-0.091 * (0.052)	-0.099 ** (0.045)
Capital per worker			0.483 *** (0.165)	0.075 (0.151)	0.046 (0.153)
TFP-growth			0.854 *** (0.275)	0.354 * (0.182)	0.411 ** (0.197)
Imports, RoW				0.597 *** (0.082)	0.575 *** (0.089)
Upstreamness					-0.185 (0.926)
Production Stages					-0.780 (0.809)
Constant	6.909 *** (0.343)	6.501 *** (0.372)	4.679 *** (0.584)	1.636 *** (0.514)	2.166 *** (0.543)
Number of observations	60	60	57	57	57
Adj. R-Squared	0.033	0.219	0.457	0.688	0.699
Wald Stat	75.154	23.498	24.373	25.158	30.950
idstat	1.695	1.556	1.564	1.583	1.816

# BASELINE RESULTS: OLS, VALUE ADDED

	(1)	(2)	(3)	(4)	(5)
	Value Added	Value Added	Value Added	Value Added	Value Added
IPW, VA	-0.211 *				
	(0.115)				
IPW * LM Income		1.340 ***	0.967 ***	0.169	0.270
		(0.284)	(0.281)	(0.417)	(0.450)
IPW * UM Income		0.328	0.820	0.151	0.645 ***
		(0.323)	(0.530)	(0.285)	(0.219)
IPW * H Income		-0.256 *	-0.258 *	-0.161	-0.125 *
		(0.149)	(0.149)	(0.120)	(0.074)
Capital per worker			0.538 ***	0.176	0.067
			(0.159)	(0.177)	(0.136)
TFP-growth			0.774 ***	0.347	0.350 **
			(0.274)	(0.223)	(0.160)
Imports, RoW				0.522 ***	0.602 ***
				(0.101)	(0.080)
Upstreamness					1.142 **
					(0.466)
Production Stages					-3.310 ***
					(0.517)
Constant	6.675 ***	6.266 ***	4.430 ***	1.747 ***	216.421 ***
	(0.353)	(0.377)	(0.562)	(0.560)	(43.356)
Number of observations	60	60	57	57	57
Adj. R-Squared	0.035	0.193	0.400	0.584	0.751

# BASELINE RESULTS: 2SLS, VALUE ADDED

	(1)	(2)	(3)	(4)	(5)
	Production	Production	Production	Production	Production
IPW	-0.115 ** (0.054)				
IPW * LM Income		1.291 *** (0.183)	0.998 *** (0.250)	0.155 (0.398)	0.378 (0.485)
IPW * UM Income		0.346 (0.339)	0.889 (0.558)	0.152 (0.332)	0.585 *** (0.216)
IPW * H Income		-0.160 * (0.086)	-0.152 * (0.077)	-0.081 (0.064)	-0.111 ** (0.043)
Capital per worker			0.527 *** (0.171)	0.149 (0.185)	0.080 (0.153)
TFP-growth			0.776 ** (0.292)	0.323 (0.230)	0.487 ** (0.210)
Imports, RoW				0.551 *** (0.107)	0.480 *** (0.089)
Upstreamness					-0.498 (0.936)
Production Stages					-2.052 ** (0.789)
Constant	6.542 *** (0.337)	6.160 *** (0.376)	4.304 *** (0.578)	1.517 ** (0.596)	2.943 *** (0.567)
Number of observations	60.000	60.000	57.000	57.000	57.000
Adj. R-Squared	0.024	0.183	0.386	0.576	0.700
Wald Stat	173.967	58.082	59.929	61.089	68.696
idstat	1.455	1.419	1.461	1.410	2.348

# MEASURING COMPLEMENTARITY

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- Limits on the income story
- Use interregional feedback effect (Miller and Blair, 2009)
- China requires inputs for its own production
- China stimulates foreign supply because of interregional linkages
- Exploit input-output framework through the 1995-2010 demand shock for Chinese goods

## TWO COMPLEMENTARITY MEASURES

- Two measures on production linkages with China based on the final demand shock
- For each country, we compute the contribution to China's production (indirectly and directly)
- $\mathbf{M} = \Delta x_1 - L^{11} \Delta F D_1 = L^{11} A^{12} B^{21} \Delta F D_1 + \dots + L^{11} A^{1G} B^{G1} \Delta F D_1$
- For each country, the expansion of output  
$$\mathbf{G} = \Delta x_2$$
$$= L^{22} A^{21} B^{21} \Delta F D_1 + L^{22} A^{23} B^{23} \Delta F D_1 + \dots + L^{22} A^{2G} B^{2G} \Delta F D_1$$

# RESULTS ON GROSS OUTPUT

	(1)	(2)	(3)	(4)	(5)
IPW-1995-intermediate	-0.183 ** (0.090)	0.361 * (0.195)	0.451 *** (0.140)	0.172 (0.146)	0.205 (0.151)
IPW*M		-0.021 (0.016)	-0.045 *** (0.014)	-0.017 (0.011)	-0.017 (0.012)
IPW-*G		-0.329 *** (0.100)	-0.249 *** (0.079)	-0.148 ** (0.069)	-0.152 * (0.076)
Capital per worker			0.663 *** (0.148)	0.168 (0.158)	0.103 (0.149)
TFP			0.848 *** (0.258)	0.370 ** (0.184)	0.273 * (0.146)
Imports, RoW				0.558 *** (0.087)	0.647 *** (0.086)
UPS					1.411 *** (0.510)
NPS					-1.815 *** (0.548)
Constant	7.026 *** (0.358)	6.642 *** (0.378)	4.418 *** (0.609)	1.712 *** (0.528)	1.130 * (0.632)
Number of observations	60.000	60.000	57.000	57.000	57.000
Adj. R-Squared	0.035	0.110	0.445	0.710	0.741

## CONCLUSION AND NEXT STEPS

- Over the period 1995-2010, increased availability of Chinese goods and services is thought to have put pressure on employment in import competing sectors
- High income countries saw their output and value added shrink because their higher exposure to Chinese imports represented fierce competition.
- But in the context of shared international production, the fact that China provides cheaper intermediate goods may also offer competitive opportunities
- China's trading partners may benefit, in terms of value added and output, if their production structure is complementary to China's



## CONCLUSION AND NEXT STEPS

- Import penetration matters but with heterogeneous effects.
- Upper-middle income countries, appear to have benefit through deepening trade integration with China. Maybe a call for new trade policies beyond globalization “fatigue”.
- Sectoral analysis to differentiate between intra-sectoral and inter-sectoral trade.
- Conceptual framework: demand displacement, technical change (comments welcome), formalize linkages.

**Thank you !**

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