Exchange Rate Pass Through, Domestic Competition, and Inflation –
Evidence from the 2005/08 Revaluation of the Renminbi

Work in Progress

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Intro

- **To what extent do exchange rate movements affect inflationary pressure?**

  I.   Direct effect via "ERPT" & weight of imports in CPI

  II. Indirect effect via competitive environment and prices of domestic goods

- Discrepancy in the literature: much study of I., but only limited of II.

Research Question

What is the effect of IMPORT PRICES on DOMESTIC PRICES?

- **IPI and PPI are endogenous**.

$\Rightarrow$ Use Exrate as a driver of IPI.

- **PPI and Exrate are endogenous.** E*ndogeneity is much more worrying than in ERPT literature.*

$\Rightarrow$ Focus on Chinese exrate policy changes during last decades.

Relation to the Literature I.

- **Basis of this paper is the literature on ERPT into Import prices…**

  - **Micro PT Into Prices**: Knetter (1989 and 1993) and P. Goldberg and Verboven (2001); Hellerstein (2008) and Nakamura and Zerom (2010), Gopinath and Rigobon (2006), Gopinath and Itskhoki (2010a and b), and Gopinath et al. (2010), Schönle (2011), Auer and Schönle (2011)

  - **PT Into Price <u>Indices</u>:** Corsetti et al. (2004), Campa and L Goldberg (2005 and 2010), Europe: Campa et al. 2005, **Decline of PT**: Marazzi et al. (2005), Marazzi and Sheets (2007),Gust et al. (2006/10),

  - **Role of Emerging Markets**: Bussière and Peltonen (2008), Ca'zorzi et al. (2007)

Relation to the Literature II.

- **…but focus of its analysis is on how domestic prices respond. This is**

  - indirectly included in analysis of ERPT into total CPI,

  - more directly taken into account in analysis of ERPT into PPI (scarce, though existent),

  - but analysis of IPI PT into PPI doesn't exist (?)

- Most related to this paper are exercises investigating link between import competition and domestic prices: Kamin et al. (2006), Chen et al. (2009), Auer and Fischer (2010), and Auer et al. (2011), Gust et al. (forthcoming), Guerrieri et al. (2010), Bugamelli et al. (2010)
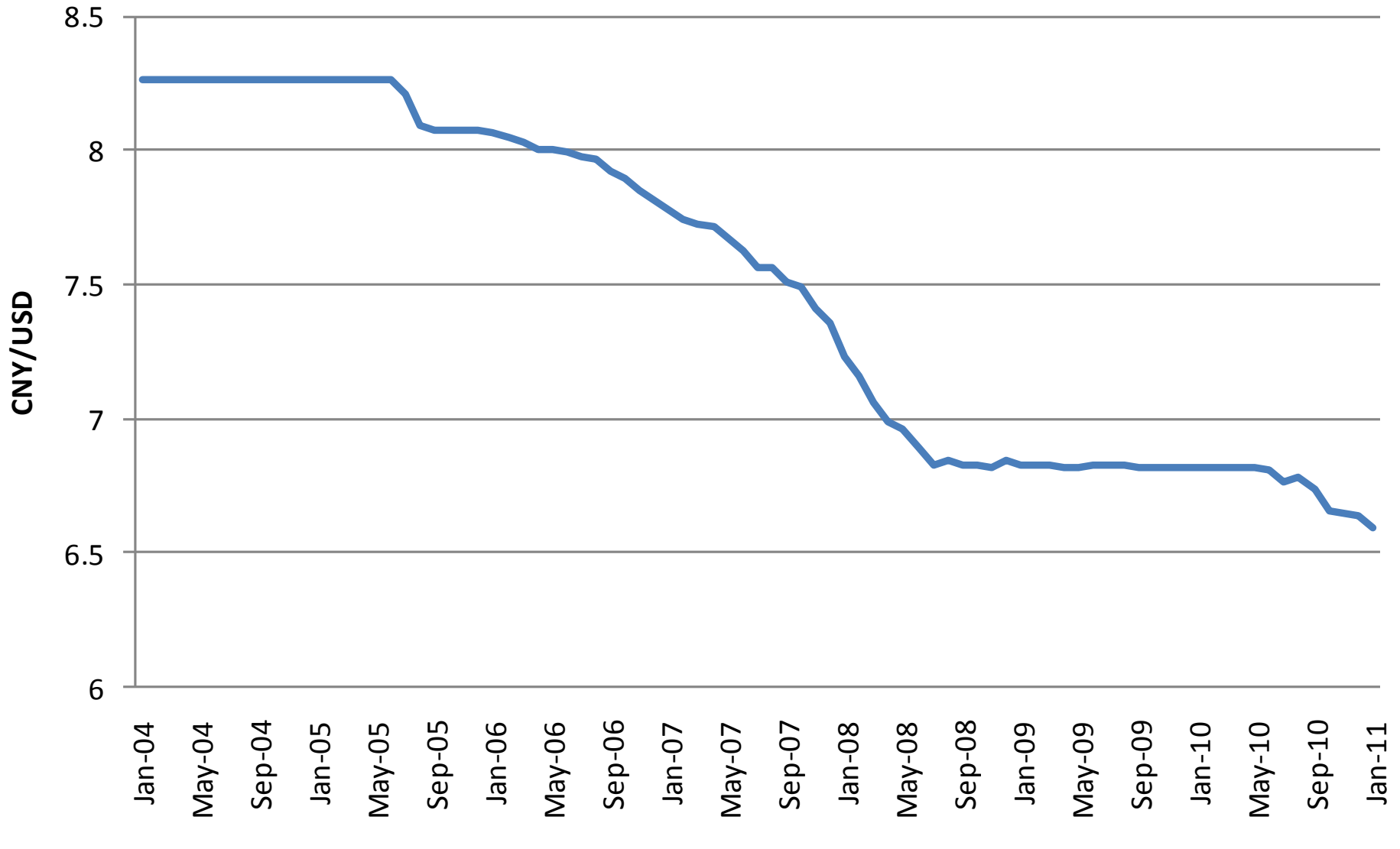
Outline of the talk

I. Chinese exchange rate policy from 1994 to 2011

II. IPI PT

III. PT of IPI into US producer prices:

    I. OLS versus 2SLS results (2 Strategies)

    II. (*Further evidence from the Cross Section)*

I.

Chinese Exchange Rate Policy During 1994 to 2011

What happened? Why can we utilize this?

Yuan USD Exchange Rate 2004-2011

Jan 2005 to Dec 08: 8.2665 / 6.8421 => 0.19 Ln points Appreciation, 21%

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A Policy "Experiment"?

- Is 05-08 Yuan movement exogenous?

  - No: Frankel and Wei (2007 and 2008) and Frankel (2009)

  - China followed a currency board w. 50% weight on Euro

- How can Yuan effect be disentangled from other exchange rate movements?

EUR and Yuan vs USD
Cummulative Changes Since 2005
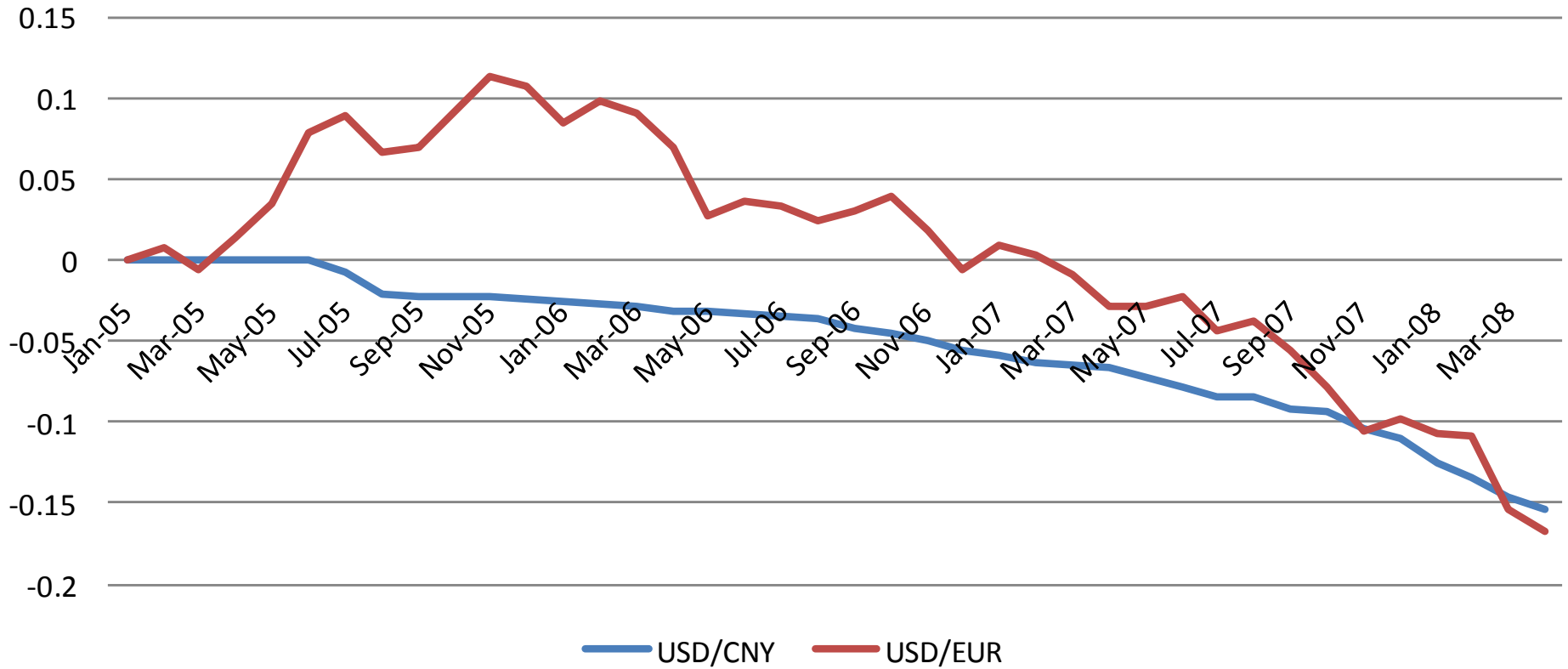
Key Part

- Utilize **Policy Changes**:

  - 1994 to mid 2005 and from 2008 to 2010, the Yuan did not move while other exchange rates, commodity prices, and global inflation did.

  - From 05 to 08 and since 2010 Yuan moved, too.

$\Rightarrow$ **Policy change had an effect on the US and we can evaluate it**

EUR and Yuan vs USD
Cummulative Changes Since 1999

Legend: USD/CNY, USD/EUR
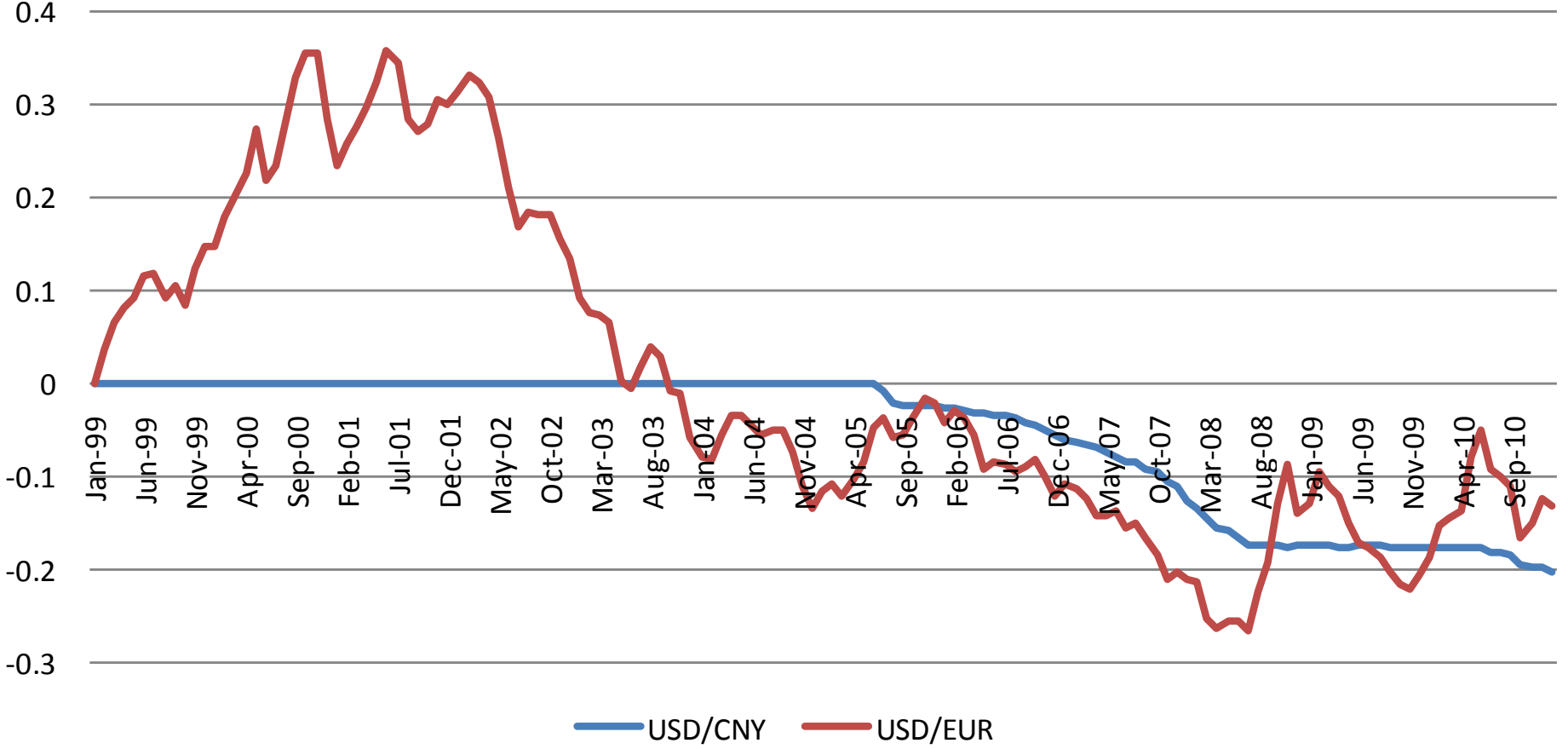
II.

ERPT Into Import Prices

PT Estimations

- Cumulative response of prices relative to exchange rate movements.

- n-months regression of price changes on Yuan and ROW exchange rate changes at horizons from 1-24m:

$$\Delta p_{i,t,t-j} = \alpha_i + \beta_{j,c}\Delta e_{c,t,t-j}$$

$$+ \beta_{j,ROW}\Delta e_{ROW,t,t-j} + \Delta X_{i,t-j} + \varepsilon_{i,t}$$

Preliminary: PT into Individual Import Prices

- Auer and Schönle (2011) estimate: PT estimations using the unpublished BLS Import Price Data (for example used in Gopinath and Rigobon 2008)

- Auer and Schönle split exchange rate movements into general "USD movements" and "Trade partner specific movements"

Country/Horizon	Trade-Partner	USD	Trade-Partner	USD
	6 months		12 months	
Canada	0.53	1.36	0.31	1.06
Mexico	0.01	0.48	0	0.46
Sweden	0.57	-0.63	0.96	1.1
Norway	0.15	0.34	0.09	0.74
Finland	0.23	0.45	0.51	1.06
Denmark	0	0.07	-0.05	0.28
UK	0.23	0.24	0.31	0.2
Ireland	0.29	0.47	0.42	-0.11
Netherlands	0.29	0.79	0.26	0.73
France	0.07	0.26	0.04	0.44
Germany	0.47	0.22	0.54	0.61
Austria	0.36	0.33	0.36	0.22
Czech Republic	0.07	0.2	-0.07	-0.52
Hungary	-0.13	0.6	-0.7	1.57
Switzerland	0.5	0.15	0.61	-0.17
China	0.81	-0.31	1	0.32
Portugal	0.37	0.43	0.21	0.12
Italy	0.26	0.25	0.21	-0.07
Greece	0.09	0.45	0.53	0.96
Singapore	-0.59	0.68	0.22	0.23
South Korea	0.1	0.32	0.14	0.55
Japan	0.32	0.24	0.37	0.8
Australia	0.44	0.88	0.8	1.18
New Zealand	0.21	0.55	0.1	0.53
Mean	0.24	0.37	0.30	0.51
Median	0.25	0.34	0.29	0.50

IPI ERPT

- Estimate the price response into Import Price Indices (IPI).

Data:

- BLS: 161 NAICS 3/4/5-digits Import Price Indices, from which it is possible to construct 122 NAICS 5-digit indices.

- For longer sample, concord NAICS price indices with preexisting SITC IPIs

- IFS Exrates, IFS PPI inflation, GSCI Commodity, Census Cap. Utilization

Baseline PT Estimations (FE Panel)

Dep. Var. is IPI Change over:			
	1 month	3 months	6 months
1 Month Ch. USD/Yuan	**0.1248**		
	[0.0928]		
3 Months Ch. USD/Yuan		**0.1536**	
		[0.0728]*	
6 Months Ch. USD/Yuan			**0.1835**
			[0.0586]**
1-Month Ch. USD/ROW Exrate	**0.0011**		
	[0.0243]		
3-Months Ch. USD/ROW Exrate		**0.0643**	
		[0.0250]*	
6-Months Ch. USD/ROW Exrate			**0.009**
			[0.0260]

- ## Baseline Estimation: **FE Panel, includes Yuan and ROW Exrates, Commodity Prices, PPI Abroad, Seasonality**

Cum. ERPT Into Import Prices
(Yuan vs. ROW Exchange Rate)
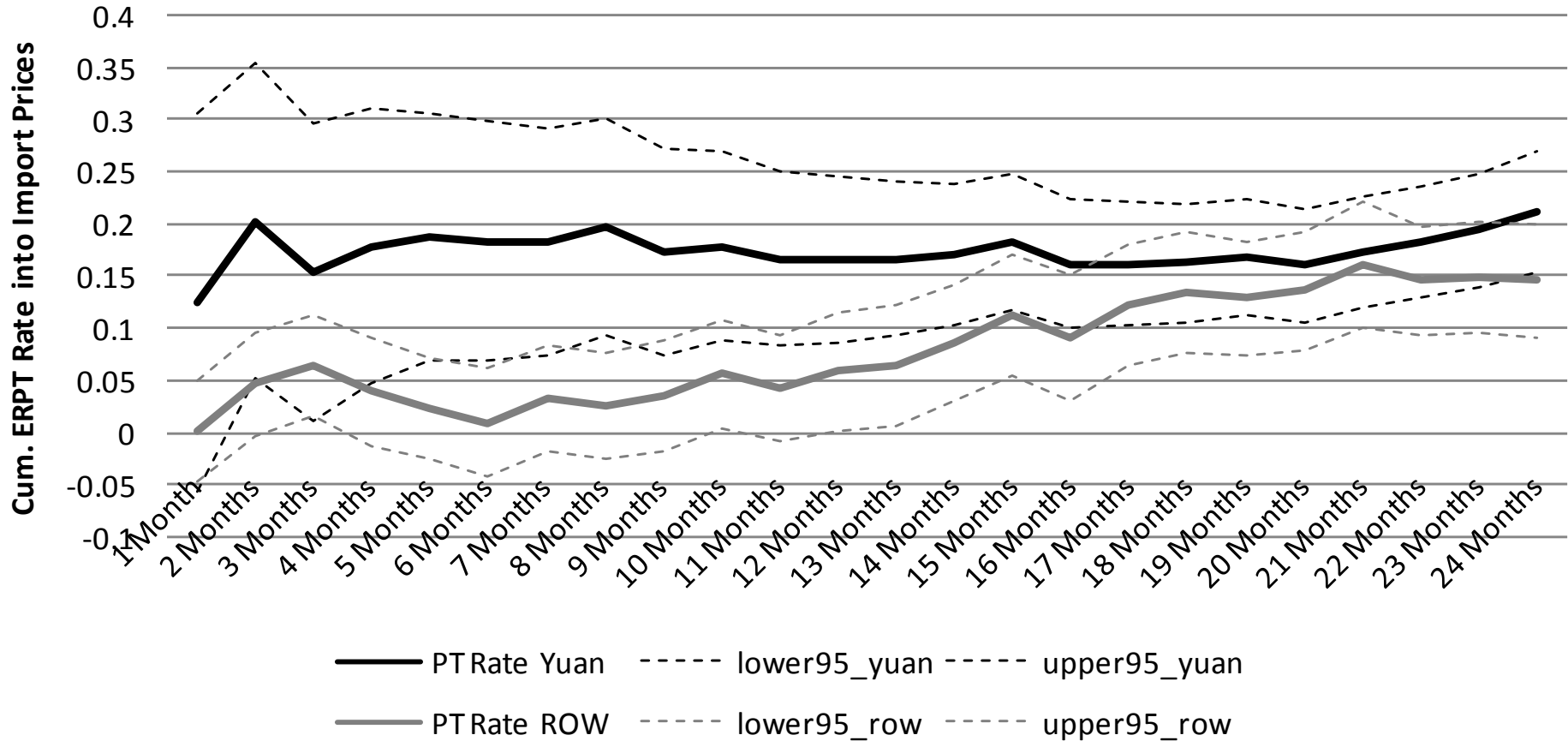
- Although Chinese Imports make up only 1/3 of US imports, **a Yuan movement affects the US IPI more than a ROW movement!**

- Is this driven by Chinese Imports beings different from ROW imports? **See section on cross section (omitted).**

- Aside: results consistent with Marazzi et al. 05 and Marazzi and Sheets 07

III

IPI PT Into PPI

IPI into PPI

- BLS: "Producer Price is the selling prices received by domestic producers for their output."

- PPI is **net** of distribution costs

- 427 BLS PPI Indices at NAICS 6-digit for entire sample period can be matched to import price index.

Two IV Strategies

- Need to take into account that Yuan could be driven by other variables, that have a direct effect on IPI:

  - **A: Controlling.** Use sample 1994-2011. Other variables move all the time, whereas Yuan only 05-08 and from 01 onwards.

  - **B: Filtering.** use 94-05 period to filter out effect of all other variables if Yuan does not co-move, then run PT regressions on filtered IPI in 05-08.

IPI PT into PPI – Strategy A

**The Pass Through of Import Prices Into Producers Prices**

	OLS			2SLS (Strategy A: Controling)		
b						
	3 months	*6 months*	*12 months*	*3 months*	*6 months*	*12 months*
Cum. 3-M Change IPI	0.333			**0.9131**		
(**bold** indicates 2SLS coefficient)	[0.0055]**			**[0.0455]**		
Cum. 6-M Change IPI		0.4222			**0.9057**	
(**bold** indicates 2SLS coefficient)		[0.0053]**			**[0.0313]**	
Cum. 12-M Change IPI			0.4445			**0.8837**
(**bold** indicates 2SLS coefficient)			[0.0054]**			**[0.0221]***

First Stage of the 2SLS Estimations (Instrument is Change of Ln(USD/Yuan) at the 3, 6, or 12 month horizon)

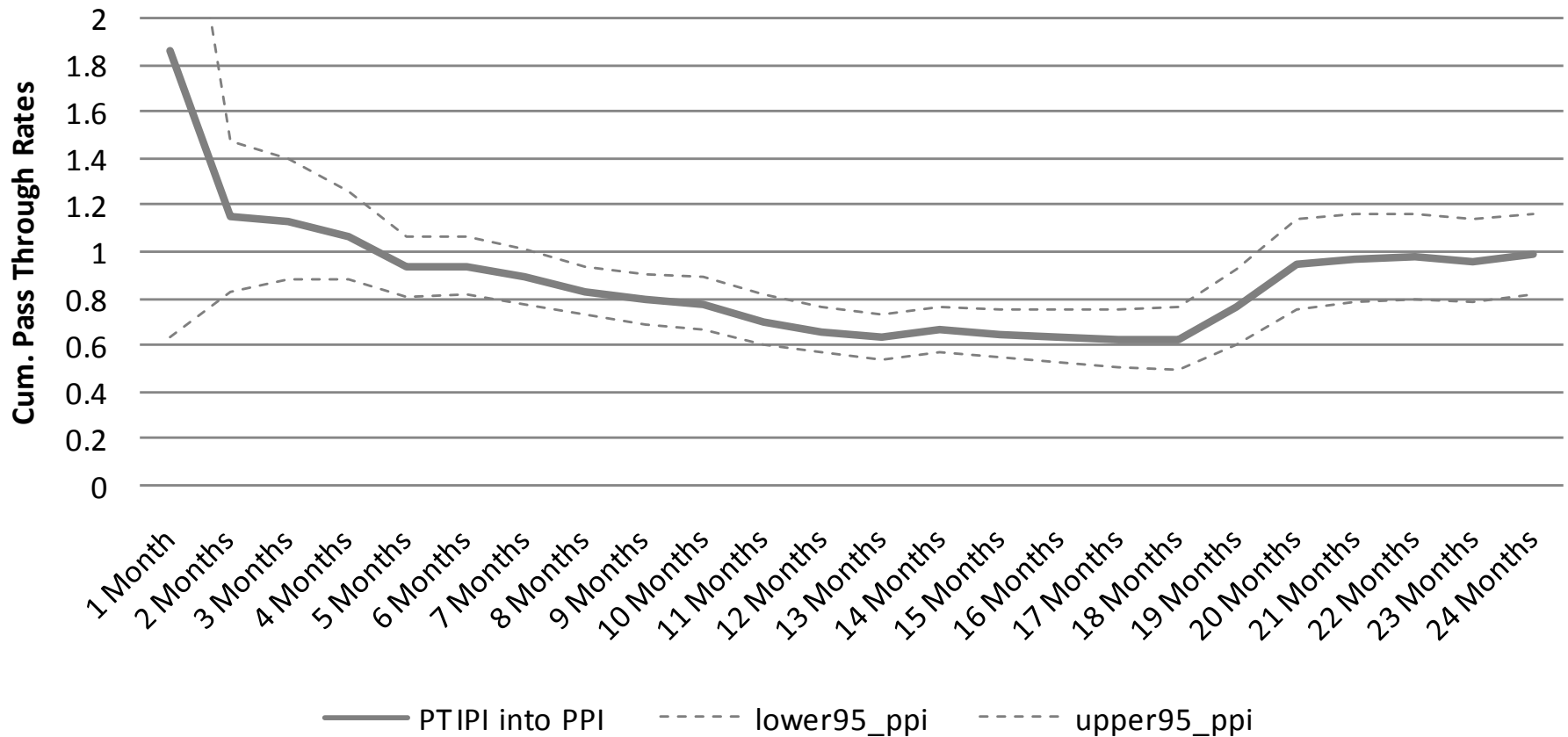|						
P-value Assoc. w. Anderson canon. cor. LR statistic				<0.0001	<0.0001	<0.0001
Cragg-Donald F Statistic				996.551	1818.745	4219.161
10% Stock-Yogo Critical Value				16.38	16.38	16.38

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IPI PT into PPI – Strategy A

The PT of the IPI into <u>PRODUCER</u> Prices: IV versus OLS Results

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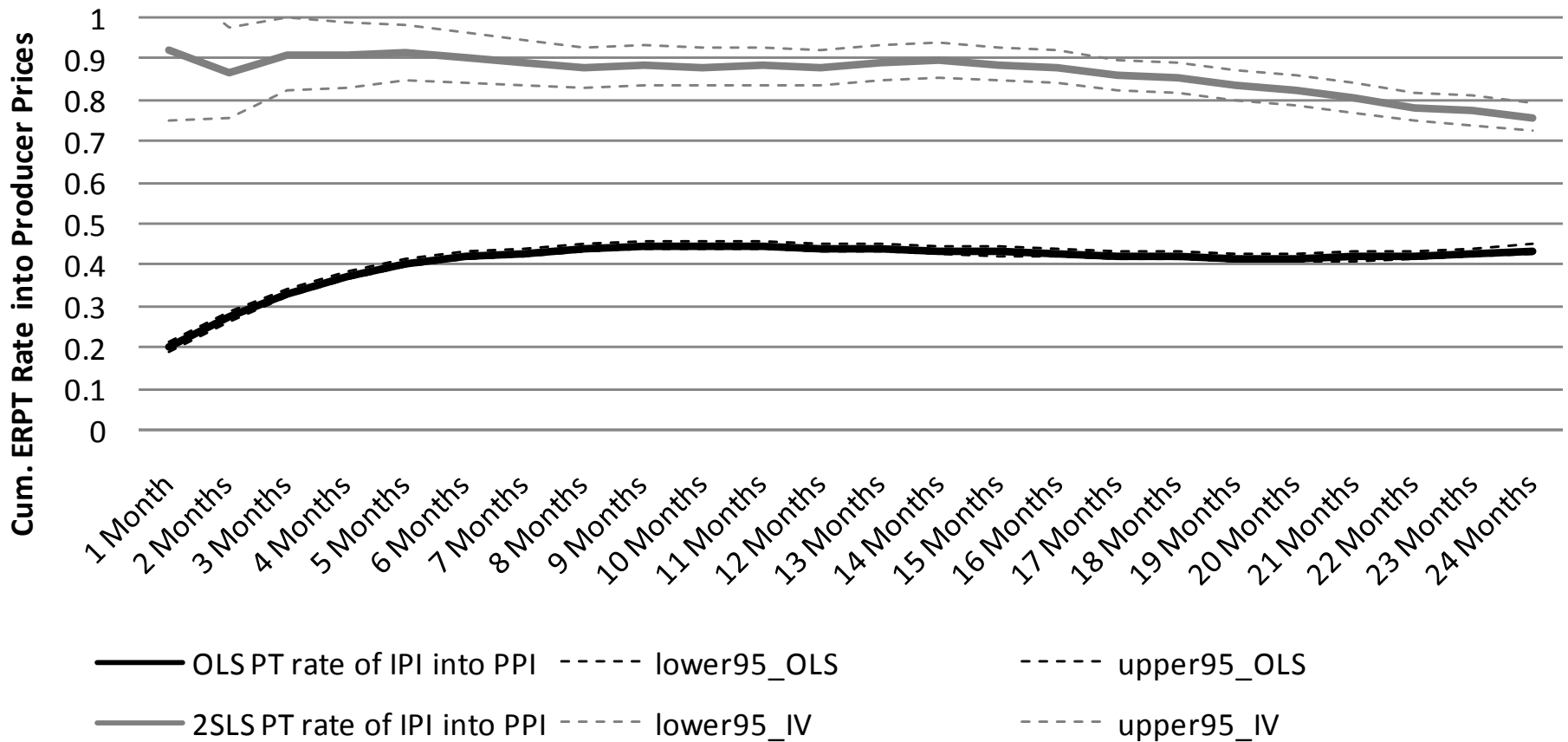
IPI PT into PPI – Strategy B

PT of Yuan Into IPI and IPI into PPI
(Post-05, netting out other vars using Pre-05)

III.II *(Omitted)*

Further Evidence from the Cross Section

Shouldn't Different Sectors be Affected Differentially by the USD/Yuan?

Conclusion

1. This paper utilizes a unique exchange rate Policy Regime Change of a Sizeable US Trade Partner.

2. It finds that PT of IPIs into PPIs is large.

$\Rightarrow$ **Markets for domestic and imported goods are well integrated**. (actually consistent with Gust et al.?)

$\Rightarrow$ Direct **Policy Implications** for **USA**, for the **Eurozone** (see Auer et al. (2011)) and perhaps for **Canada** (*data?*).

Aside: what if we repeat strategy with ROW exchange rate ?

**The PT of the IPI into PRODUCER Prices:
IV with ROW Exrate as Instrument**

Legend: 2SLS PT Rate (w. Com. Prices) — lower95_IV — upper95_IV
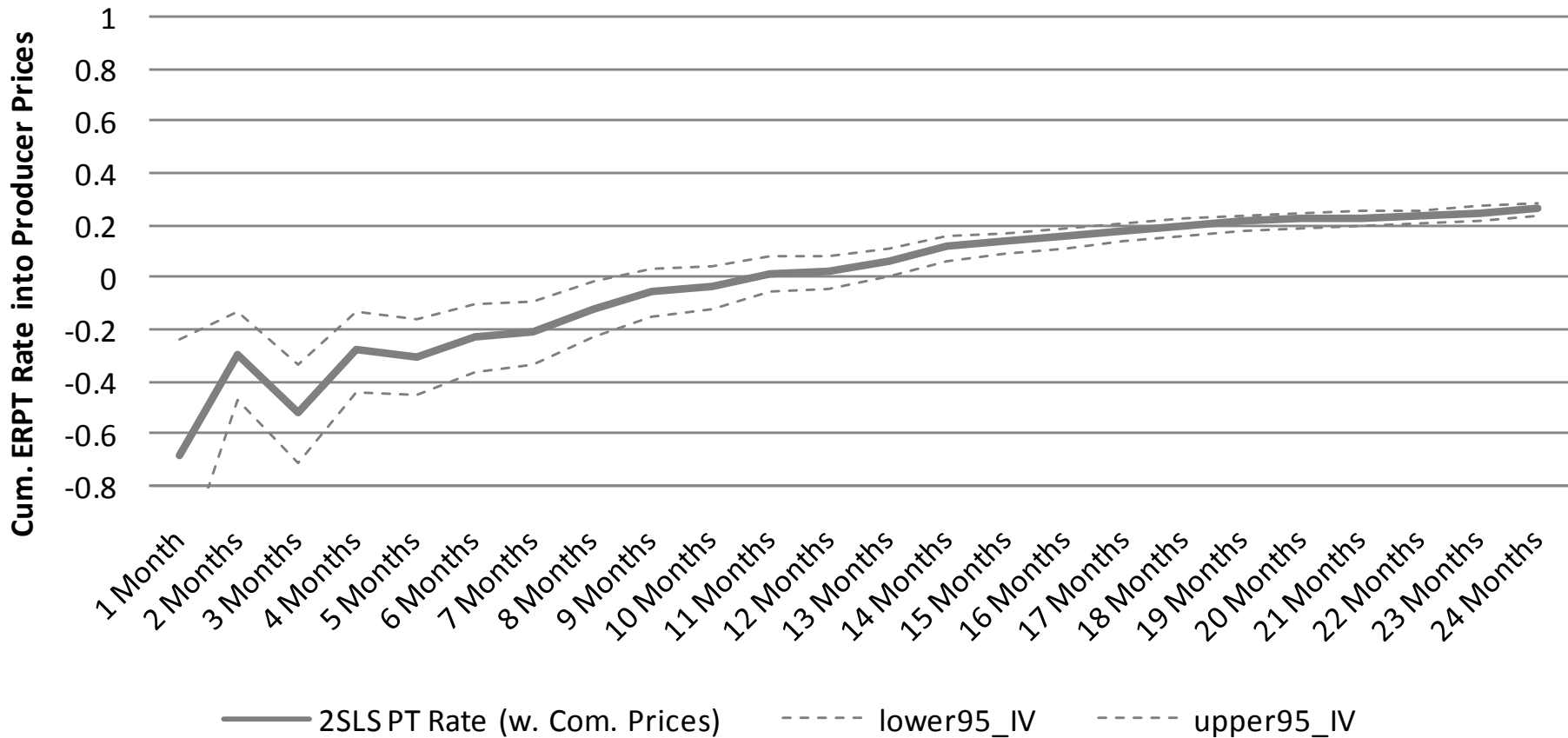
Making Sense of OLS and IV ROW Results

- If US economy booms, PPI up and USD appreciates.

$\Rightarrow$ Direct upward shock on IPI due to increased US demand.

$\Rightarrow$ Negative shock on IPI (counted in USD) as other currencies depreciate. Thus:

- In the OLS regression IPI on PPI, 2 opposite biases

- In the IV ROW only negative bias as it isolates the exchange rate-induced effect.