

# **Currency Unions and Trade:**

## **The Effect is Large**

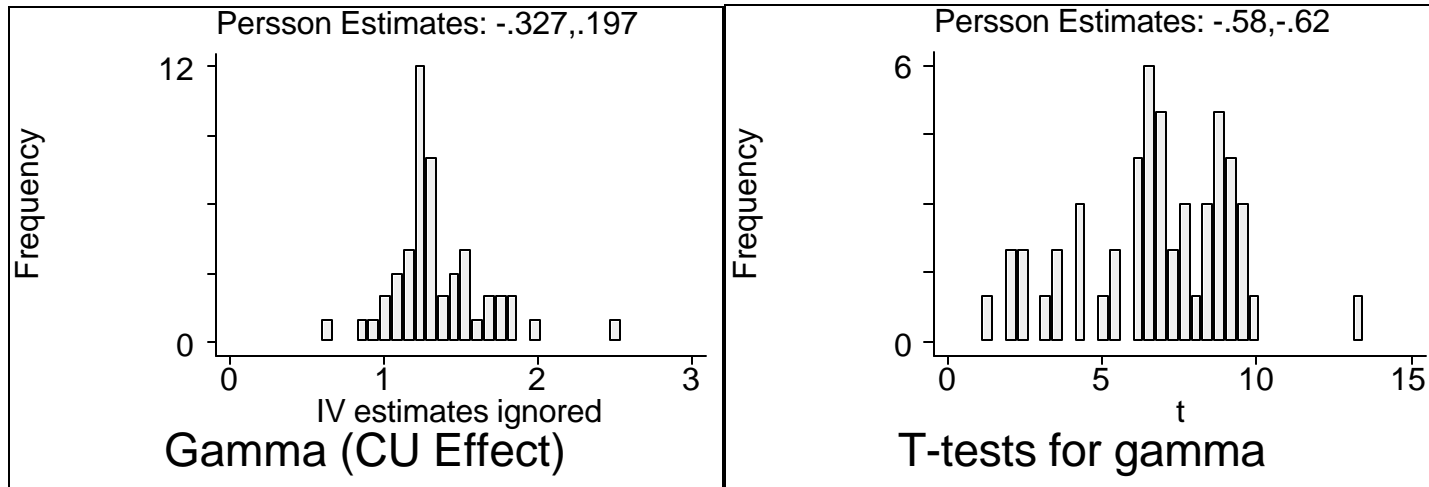
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## **Effect of CU on Bilateral Trade (g) *seemed* to be robust**

- Many sensitivity analyses in original paper
- No need/reason to take exact size literally
- Rogoff's "search and destroy" mission

# Persson's Estimates are *miles* away from mine



## **(Non-?) Issues with My Approach**

- Non-Linearities
- Non-Random Selection

## Non-Linearities

- Evidence?
- 1M1M:
  - Sample sensitivity analysis
  - Non-parametric estimation
  - Direct inclusion (interactions, quadratic terms)
- Colonial History and Proximity *doesn't* work

## Non-Random Selection

- Quah vs. Persson on similarities of country pairs:

(p. 38): “Glancing down the main columns, the two groups seem surprisingly alike...”

- Me vs. Persson in original version:

“The average values of the key gravity regressors for currency union observations are below but close to those for the rest of the sample.”

## Careful Language

- On link between currency unions and gravity regressors:

“first cursory look ... suggests that such a correlation is present in Rose’s data set. Indeed the correlation is 0.2 or higher (in absolute value) for six out of the nine variables ...” (Persson)

“first cursory look ... suggests that such a correlation is not present in Rose’s data set. Indeed the correlation is 0.3 or lower (in absolute value) for nine out of the nine variables.” (Me)

## Matching instead of Conditioning

- Non-EMU countries are small and/or poor
  - Hence *less* bilateral trade for CUs than non-CUs  
*(unconditionally)*
  - These effects conditioned out via gravity model
    - (*Aggregate* trade/GDP still *higher* for CUs)
- Is it done appropriately via matching?
  - If not, will find unconditional (negative) results
  - Are country-pairs as homogeneous as people?



## **An Equation Too Far?**

- Modelling bilateral CU membership critical to Persson
- I found it very hard to model currency union membership empirically (to find IVs)

## Interpretation of Persson's Probit CU Model

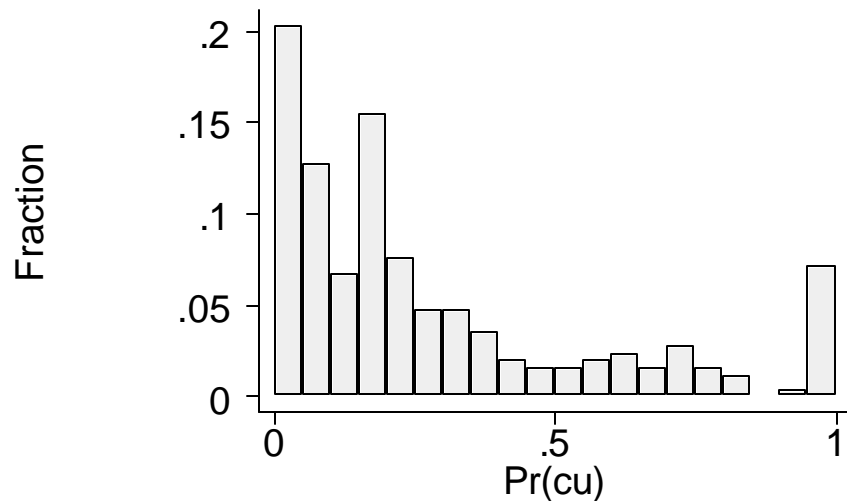
- Lacking in theory
  - Few Mundell-style considerations (BC-synchronization, labour mobility, risk-sharing, etc.)
  - No central bank credibility
  - No political economy
- Is it legitimate to condition on *these* observables?

## **Nerdy Issues**

- Time effects (significant at .000)
- Country effects (significant)
- Panel nature of data set (robust standard errors)
- Other plausible gravity regressors (significant at .000)

## Persson's Model in Practice

- Critical: *only 1% of sample in Currency Unions*
  - So model fits well by predicting that *no currency unions exist*
  - Model mis-predicts 84% of actual CUs, only .02% of non-CUs



Histogram of Fitted Probit for CUs

## Some Uncomfortable Matches

Mechanistic Probit matching leads to subtle choices:

- US-Panama in 1990 matched to Zimbabwe-Norway (1990)
  - US-Panama in 1985 matched to Pakistan-Denmark (1985)
- (two lowest probability CUs)

Ditto for the Logit:

- US-Panama in 1990 matched to Nepal-Spain (1985)
- US-Panama in 1985 matched to Bangladesh-Czechoslovakia (1990) or Morocco-Vietnam (1990)

## **Out of Sample Tests of Persson's Model**

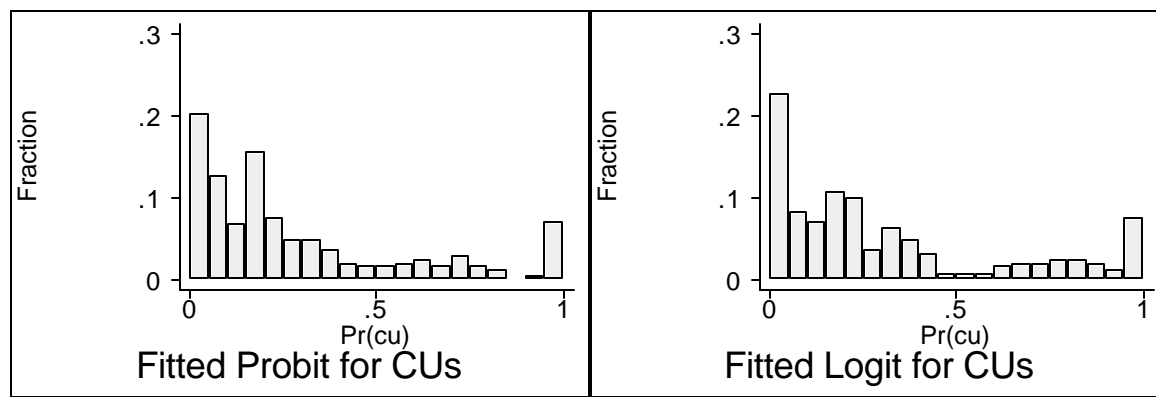
- El Salvador dollarizes with p-value < .0005
- Ecuador dollarizes with p-value < .0001
- EMU occurs with median likelihood .0009

## Probit vs. Logit

	<b>Probit</b>	<b>Logit</b>
Real GDP	-.11 (7.5)	-.24 (7.2)
Real GDP/capita	-.04 (1.5)	-.16 (2.8)
Distance	-.47 (11.6)	-1.01 (11.5)
Common Border	-.12 (1.0)	-.38 (1.4)
Common Language	.72 (8.9)	1.72 (8.3)
Regional Trade Agreement	-.51 (3.6)	-1.40 (4.8)

Obs=26,608. Intercept and colonial history controls not reported. Absolute t-statistics beneath coefficients.

	<b>Probit</b>		<b>Logit</b>	
	Predicted non-Currency Union	Predicted Currency Union	Predicted non-Currency Union	Predicted Currency Union
Actual non-Currency Union	33,565	8	33,565	8
Actual Currency Union	278	52	278	52



## Old and New Data Sets

- Old: United Nations, 1970-1990, 186 countries, 34,000 observations
- New: International Monetary Fund, 1948-1997, 231 countries,  
427,000 observations
- 1% of sample (4,255 observations) are currency unions



## Descriptive Statistics for IMF Data Set

	<b>Non-Unions</b>	<b>Currency Unions</b>
<b>Observations</b>	422,987	4,255
<b>Log Real Trade</b>	10.7 (3.7)	10.5 (3.1)
<b>Log Distance</b>	8.2 (.8)	7.1 (1.0)
<b>Log product GDP</b>	47.9 (2.6)	44.7 (3.0)
<b>Log product GDP/capita</b>	16.1 (1.4)	14.4 (1.6)
<b>Common Language Dummy</b>	.15 (.35)	.85 (.36)
<b>Land Border Dummy</b>	.02 (.14)	.18 (.38)

Means, with standard deviations reported in parentheses

## Gravity Works well!

<b>Currency Union</b>	1.49 (11.5)
<b>Log Distance</b>	-1.15 (48.7)
<b>Log Product Real GDPs</b>	.94 (94.0)
<b>Log Product Real GDP/capita</b>	.45 (29.5)
<b>Common Language</b>	.47 (11.2)
<b>Common Land Border</b>	.41 (3.6)
<b>Observations</b>	219,558
<b>R<sup>2</sup></b>	.63
<b>RMSE</b>	2.03

Absolute t-statistics in parentheses; 219,558 observations

## Fixed Effects (“within”) estimator was infeasible on UN data

- Few switches of currency union regime => can’t use time-variation

	<b>Fixed-effects  (“within”)</b>	<b>Random-effects  GLS</b>
<b>Currency Union</b>	-.38 (0.6)	1.23 (6.0)

22,948 observations, gravity controls

## Strength of Fixed Effect Estimator

- Most robust way to estimate effect if: a) time-variation exist; b) second moments are second order
- Answers policy question of interest (which is time series, not cross-section):
  - “What is effect on trade of entry into/exit from currency union?”
- Compares “like” to “like” => no matching necessary
- Handles Anderson-van Wincoop

## Fixed Effects (“within”) estimator is feasible on IMF data

- 146 (instead of 8) regime switches

	<b>Fixed-effects</b> (“within”)	<b>Random-effects</b> <b>GLS</b>	<b>Between</b> <b>Estimator</b>	<b>Maximum</b> <b>Likelihood</b>
<b>Currency</b> <b>Union</b>	.72 (13.6)	.81 (15.5)	1.68 (7.1)	.79 (15.2)

219,558 observations, gravity and year controls

## **CU Effect (g) is smaller but significantly positive**

- .72 instead of 1.21
- Trade doubles instead of tripling

## Persson's Technique on IMF Data

- Significantly *positive* effect of CU on trade (t-stat of 3.2) with radial matching estimator

## **New larger data set confirms positive CU effect on trade:**

- My technique
- Persson's technique
- FE estimator (better than either, previously unavailable)



## Conclusion

- Two approaches to estimate effect of currency union on trade
  1. (Conditional) model of trade
    - Easy with gravity model
  2. (Marginal) model of currency unions
    - Difficult
    - Gravity is a model of trade *not currency union*
- Persson and I agree: more research on CU/trade