The Effect of Common Currencies on International Trade: A Meta-Analysis

Andrew K. Rose

Data Set

- 19 studies estimate currency union effect on trade
- 383 point estimates of γ

Estimates of the Effect of Currency Union on Trade

Author	Year	γ	s.e. of γ
Rose	2000	1.21	0.14
Engel-Rose	2002	1.21	0.37
Frankel-Rose	2002	1.36	0.18
Rose-van Wincoop	2001	0.91	0.18
Glick-Rose	2002	0.65	0.05
Persson	2001	0.506	0.257
Rose	2001	0.74	0.05
Honohan	2001	0.921	0.4
Nitsch	2002b	0.82	0.27
Pakko and Wall	2001	-0.378	0.529
Walsh and Thom	2002	0.098	0.2
Melitz	2001	0.7	0.23
López-Córdova and Meissner	2001	0.716	0.186
Tenreyro	2001	0.471	0.316
Levy Yeyati	2001	0.5	0.25
Nitsch	2002a	0.62	0.17
Flandreau and Maurel	2001	1.16	0.07
Klein	2002	0.50	0.27
Estevadeoral, Frantz, and Taylor	2002	0.293	0.145

Estimates of γ and standard error from

$$\ln(\text{Trade}) = \gamma\text{CurrencyUnion} + \text{controls} + \text{error}$$

Meta-Analysis

- Set of quantitative techniques for evaluating and combining empirical results from different studies.
- Different point estimates (one per study) of given coefficient treated as individual observations
- Can use this vector of estimates to:
  - estimate underlying coefficient of interest
  - test hypothesis that coefficient is zero
  - link estimates to features of the underlying studies
- Each study weighted equally

Test of Zero Effect

- Test null hypothesis $\gamma=0$, pooling 19 point estimates (and standard errors)
- Test due to Fisher (1932), uses p-values from 19 underlying γ estimates
- Under null hypothesis, p-values are independently and randomly drawn from a normal [0,1] distribution, $-2\Sigma\ln(p_i)$ is χ^2
- Test statistic: $577 \sim \chi^2(38)$ under Ho.

Meta-Estimates

	Pooled Estimate of γ	Lower Bound of 95% CI	Upper Bound of 95% CI	P-value for test of no effect
Fixed	.77	.72	.83	.00
Random	.73	.58	.88	.00
Fixed without Rose	.80	.71	.90	.00
Random without Rose	.57	.32	.83	.00

Table 1: Meta-Analysis of Currency Union Effect on Trade (γ)

Findings

- Considerable heterogeneity
- But fixed and random effect estimators are quantitatively similar
- Economically big; currency union more than doubles trade, ln(2)≈.69
- No conclusions change if my six studies are dropped
    - Test-statistic rejects the hypothesis of no effect: $203 \sim \chi^2(26)$ under Ho

Influential Studies?

- No single study is especially influential
- If studies are omitted from meta-analysis one by one:

Study Omitted:	Coefficient	95% CI, lower	95% CI, upper
Rose	.75	.70	.81
Engel-Rose	.77	.72	.82
Frankel-Rose	.76	.70	.81
Rose-van Wincoop	.77	.71	.82
Glick-Rose	.82	.76	.89
Persson	.77	.72	.83
Rose	.78	.72	.85
Honohan	.77	.72	.82
Nitsch	.77	.72	.82
Pakko-Wall	.77	.72	.83
Walsh-Thom	.78	.73	.84
Melitz	.77	.72	.83
Lopez-Cordova and Meissner	.77	.72	.83
Tenreyro	.77	.72	.83
Levy Yeyati	.77	.72	.83
Nitsch	.78	.72	.83
Flandreau and Maurel	.70	.65	.76
Klein	.77	.72	.83
Estevadeoral, Frantz, and Taylor	.79	.73	.84
Combined	.77	.72	.82

Table 2: Sensitivity of Meta-Analysis of γ to Individual Studies

Does Choice of "Preferred" Estimate Matter Much?

- Can use different estimates from (19) underlying studies
- All are economically large, economically significant

		Pooled γ Estimate	Lower 95% CI	Upper 95% CI	P-value of no effect
"Preferred"	**Fixed**	.77	.72	.83	.00
"Preferred"	**Random**	.73	.58	.88	.00
Median	**Fixed**	.61	.56	.67	.00
Median	**Random**	.85	.58	1.13	.00
25th-Percentile	**Fixed**	.30	.26	.35	.00
25th-Percentile	**Random**	.52	.30	.75	.00
10th-Percentile	**Fixed**	.21	.17	.25	.00
10th-Percentile	**Random**	.37	.16	.57	.00
5th-Percentile	**Fixed**	.15	.12	.18	.00
5th-Percentile	**Random**	.36	.18	.55	.00

Table 3: Sensitivity of Meta-Analysis of γ to Choice of "Preferred" Estimate

Which Study Characteristics drive Outcomes?

- Hard to do multivariate regression with 18 observations

Study Characteristic	Slope Coefficient (|z-statistic|)	Intercept (|z-statistic|)
Number of Observations in study	.00 (0.0)	.72 (7.2)
Number of Countries in study	.00 (0.6)	.64 (3.9)
Number of Years in study	-.00 (0.4)	.78 (4.7)
Dummy for post-WWII study	-.03 (0.1)	.75 (3.8)
Dummy for cross-section or panel study	.24 (1.2)	.54 (3.0)
Dummy for Rose as Author	.38 (2.3)	.59 (5.8)

Table 4: Meta-Analysis: Bivariate Determination of γ Across Studies

Three results

1. No positive relation between the number of observations and γ
   - Worrying!
2. Papers that I co-author have higher point estimates
3. No strong relationships between characteristics of studies and point estimates

Different Estimates of γ

- 19 studies but 383 estimates of γ
  - Mean γ is 1.4
  - Mean t-ratio is 5.7
- Histograms of 383 γ estimates and t-statistics, split into Rose/non-Rose (less outliers)
- Vast majority γ are positive; only 30 of the 383 (8%) are negative; 63% exceed .7

- Cannot reject hypothesis of equal means across my estimates and those of others (1.56~t)

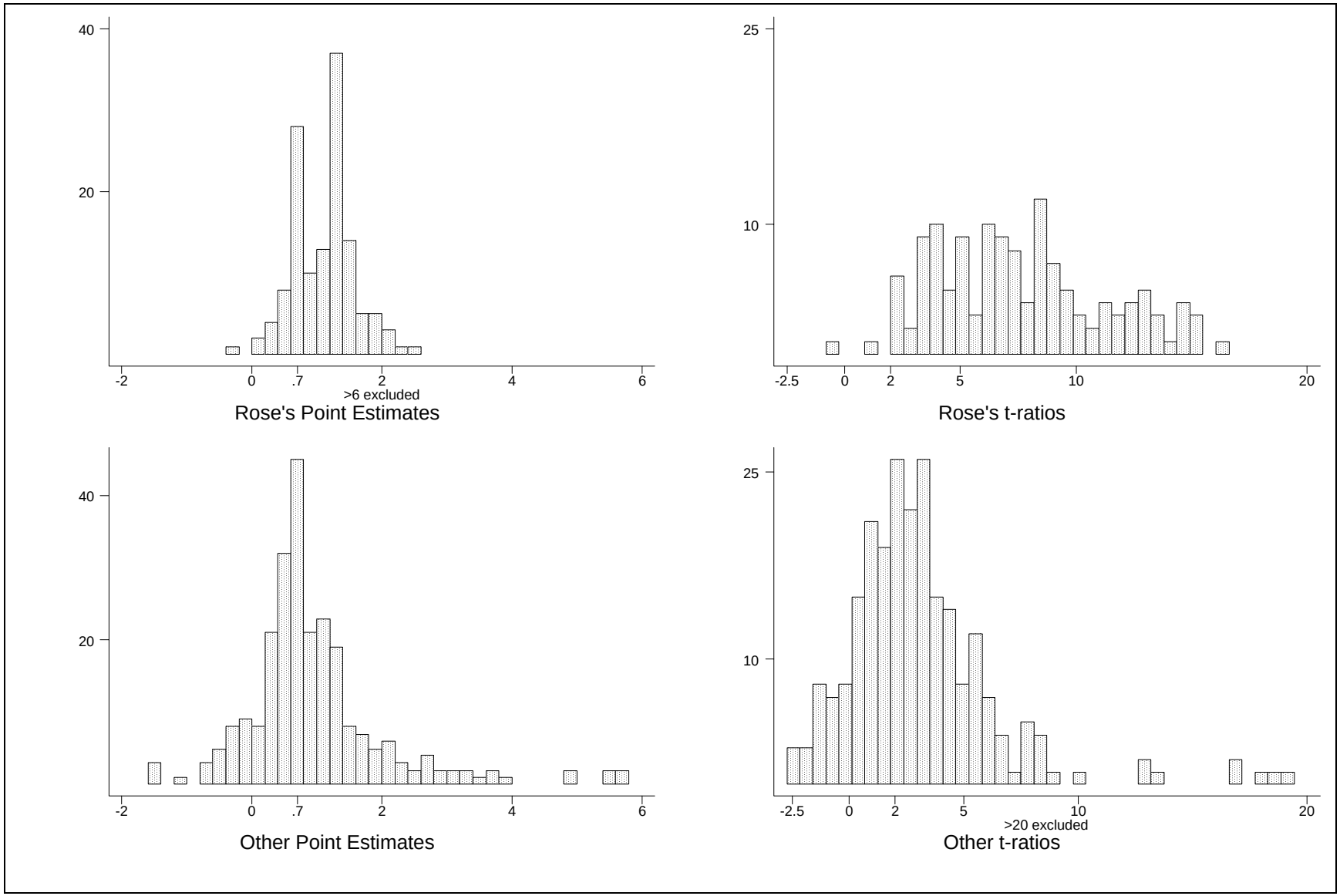

Figure 1: Estimated Effect of Currency Union on Trade

- Many estimates statistically significant
- Median t-statistic is 4.1
- 76% (290/383) exceed 2

Study		Coefficients	Asymptotic z-statistics	p-values	No. of Estimates
Rose	Fixed	1.29	50.6	.00	52
	Random	1.31	32.9	.00	
Engel-Rose	Fixed	1.35	7.4	.00	5
	Random	1.35	7.4	.00	
Frankel-Rose	Fixed	1.63	19.8	.00	5
	Random	1.63	11.8	.00	
Rose-van Wincoop	Fixed	0.23	13.8	.00	18
	Random	0.65	7.7	.00	
Glick-Rose	Fixed	0.70	59.3	.00	37
	Random	0.77	27.8	.00	
	Fixed	0.65	7.7	.00	6
Persson	Random	0.59	4.8	.00	
Rose	Fixed	0.82	43.5	.00	17
	Random	1.06	8.9	.00	
	Fixed	0.35	3.7	.00	12
Honohan	Random	0.36	1.9	.05	
Nitsch	Fixed	3.00	111.4	.00	83
	Random	1.55	6.8	.00	
Pakko-Wall	Fixed	0.87	8.5	.00	6
	Random	0.33	0.9	.35	
Walsh-Thom	Fixed	-0.01	-0.6	.57	7
	Random	0.02	0.6	.54	
Melitz	Fixed	1.89	21.7	.00	6
	Random	1.91	10.8	.00	
Lopez-Cordova and Meissner	Fixed	0.72	21.6	.00	47
	Random	0.72	20.7	.00	
Silvana Tenreyro	Fixed	0.80	9.5	.00	4
	Random	0.71	4.2	.00	
Levy Yeyati	Fixed	1.01	16.4	.00	19
	Random	1.06	11.4	.00	
Nitsch	Fixed	0.46	5.6	.00	8
	Random	0.43	2.6	.01	
Flandreau and Maurel	Fixed	0.94	35.9	.00	8
	Random	0.90	7.3	.00	
Klein	Fixed	0.09	2.5	.01	25
	Random	0.37	2.0	.05	
Estevadeoral et. al.	Fixed	0.43	0.37	0.50	18
	Random	0.45	0.35	0.55	

Table 5: Within-Study meta-estimation of γ

Conclusion

- Too early to claim much
    - Would prefer 30 observations
    - Studies are dependent and not all of equal interest
    - Estimates of γ are heterogeneous, cannot be linked to study features
- But: substantial evidence currency union has a positive effect on trade
- Effect is large economically, statistically
    - Currency union associated with a doubling of trade