

Estimating the Effect of Currency Unions on Trade and Output

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Why Should Currency Unions Affect Output/Growth?

Standard View

- Direct benefits from superior monetary policy, enhanced credibility
 1. Better central bank performance
 2. Lower inflation
 3. Deeper financial markets

Alternative View

- Benefits are indirect, stem from increased openness to trade

Objective of this Paper

- Distinguish between direct and trade-induced benefits of currency unions using actual data on currency unions (Table A1)

Strategy

- Investigate two separate hypotheses empirically:
 1. Currency Union enhances trade and openness
 2. Openness enhances output and growth
- Implicitly, ask: does choice of anchor matter?
 - Anchor is irrelevant if direct (monetary) route is key, so long as anchor is stable

Results

1. Currency unions significantly encourage bilateral trade
2. Currency unions also encourage openness (total trade); no evidence of trade diversion
3. By raising trade, currency unions enhance output and growth
4. Since the effect is through trade, the output effect of currency union depends on the choice of anchor. Effect depends on effect on trade induced via monetary union.

The Effect of Currency Union on Trade

- Use “gravity” model of bilateral international trade
- Model includes standard gravity regressors and additional political/historical controls
- Data set includes over 30,000 observations from over 180 countries, 5-year intervals from 1970 through 1995
- Model fits well, traditional results appear, coefficients are statistically and economically significant and intuitive (Table 1)

Currency Union has a large Effect on Trade

- Currency union coefficient ≈ 1.6 .
- Currency board coefficient similar.
- Lowest estimate, implies that *currency union more than triples trade*.
- Consistent with Rose (2000) and López-Cordova and Meissner (2000) for gold-standard

Is this Result too Large to be Plausible?

- Effect is statistically very robust
- Effect is small compared to McCallum's (1995) "home-bias" effect of 20 in goods markets (replicated in our data set by removing controls)

Is There Evidence of Trade Diversion?

- Not in bilateral trade equation: CU/non-CU coefficient is *positive*, significant (so that currency union enhances openness).
- Not in aggregate openness equation (currency union raises overall trade/GDP by about twenty percent).

Effect of Trade on Output

- Much theory indicates that openness can raise output (classical trade theory) and/or growth rates (Grossman-Helpman etc.)
- Issue is empirically accounting for reverse causality between trade and output (e.g., Rodrik)
- Here, we exploit prediction of openness derived from “barebones” bilateral gravity equation using only exogenous regressors, following Frankel-Romer (1999)
- Using predicted openness as instrumental variable, estimate effect of openness on output, conditioning for other effects

The Output Equation

- We link GDP/capita in 1990 to population (and sometimes area) as “size” controls and openness (trade/GDP) using a cross-sectional regression
- Sometimes add “factor accumulation” controls:
 1. Investment/GDP ratio
 2. Population growth
 3. Primary schooling ratio
 4. Secondary schooling ratio
 5. Initial GDP per capita (in 1970)

Should Factor Accumulation Controls be Included?

- Adding controls may inappropriately reduce openness effects which are induced through factor accumulation
- Inappropriate exclusion of controls may also bias results
- We estimate both and interpret conservatively

Effect of Openness on Output

- Effect of openness on output is large, positive and significant with OLS (Table 2)
 - True with or without factor accumulation controls
- Effect of openness on output remains large, positive and significant with IV estimation
 - Without controls, coefficient ≈ 1.6 ; with controls, coefficient $\approx .4$
(with steady state impact of 1.6!)
 - Parenthetically, correlation between openness and IV $\approx .7$
- Effect is robust

What is the Effect of Currency Union on Output?

- Currency Union has a *negative* (sometimes significant) *direct* effect in the output equation (Table 3)
- When we add inner product of currency union and partner real GDP (to mimic gravity effect), result is positive and significant
 - Also true when we add more gravity terms (GDP per capita, distance)
- However weak results with controls
- We conclude that currency union has no positive *direct* effect on output, but can raise income by inducing trade

Quantifying the Indirect Benefit of Currency Union on Output

- Can estimate with an “aggregate” approach:
 - Estimate effect of currency union on openness
 - Multiply by estimated effect of openness on output
- Result is benefit of currency union $\approx 4\%$ GDP (Appendix 3) to average country
- But this estimate is uninformative since the trade effects depend on how the currency union is formed (to countries with much or little trade)

Estimating the Effects of Dollarization and “Euroization”

- Effect should vary depending on:
 - How open the country is (and therefore how much trade can grow)
 - How much trade is with Dollar/Euro zone
- Table 4 assumes that currency union triples trade with the relevant currency area (i.e., adopt \$ => trade with \$ area triples)
 - This delivers effect on trade
- Table 4 assumes that effect of openness on output $\approx .33$ (from Table 2)
 - This delivers effect on output

Sensitivity Analysis

- Some estimates in Table 4 seem implausibly high
 - Likely culprit is high impact of currency union on trade
- However results in Table 1 seem quite insensitive
 - Can split sample by country size without affecting key coefficient
 - Can split by country size disparity
 - Can add quadratic terms in size
 - Can drop outliers (though affects output equation)

Caveats

- Possible reverse causality in trade/currency union nexus (though no evidence in favor and much against)
- Data on currency unions may simply not be applicable to candidates for dollarization (though no evidence of sensitivity)
- Unknown lag effects
- We ignore all other arguments for/against currency union

Conclusion

- Little evidence that currency union has direct positive effect on output (e.g., because of monetary stability)
- Instead currency union enhances trade and hence indirectly raises output
 - No evidence of trade diversion; currency union raises openness
- Effect of currency union therefore depends on choice of anchor/partner country

Table 1: The Effect of Currency Unions and Boards on Trade in the Gravity Model

Currency Union	2.11 (.19)	1.78 (.18)	1.38 (.19)		
Currency Board	2.08 (.52)	1.45 (.32)	.93 (.29)		
Currency Union or Board				1.36 (.18)	1.55 (.18)
Log Distance	-1.22 (.02)	-1.11 (.03)	-1.06 (.03)	-1.06 (.03)	-1.08 (.03)
Log Product Real GDP	.78 (.01)	.95 (.01)	.94 (.01)	.94 (.01)	.96 (.01)
Log Product Real GDP/capita	.66 (.02)	.47 (.02)	.48 (.02)	.48 (.02)	.45 (.02)
Common Land Border		.61 (.13)	.63 (.12)	.63 (.12)	.63 (.13)
Number land- locked (0, 1 or 2)		-.36 (.04)	-.32 (.04)	-.32 (.04)	-.30 (.04)
Log of Product of Land Area		-.17 (.01)	-.15 (.01)	-.15 (.01)	-.15 (.01)
Common Language		.83 (.06)	.56 (.06)	.56 (.06)	.54 (.06)
Common Colonizer			.40 (.08)	.40 (.08)	.36 (.08)
Ex- Colony/Colonizer			1.95 (.13)	1.95 (.13)	1.77 (.13)
Political Union			.96 (.37)	.97 (.36)	1.05 (.37)
Common FTA			1.07 (.10)	1.07 (.10)	1.06 (.10)
CU or CB/Non- CU and Non-CB					.34 (.04)
R²	.61	.63	.64	.64	.64
RMSE	2.05	2.00	1.97	1.97	1.97

Regressand is log of bilateral trade in real American dollars.

Number of Observations = 31,226.

Year-specific fixed effects not reported.

Robust standard errors recorded in parentheses.

Table 3: The Effect of Currency Unions on GDP/capita

Controls?	No	No	No	No	Yes	Yes	Yes	Yes
Currency Union Or Board	-1.79 (.27)	-1.35 (.21)	-1.23 (.24)	-1.22 (.24)	.03 (.11)	-.07 (.10)	.01 (.12)	.01 (.12)
Inner Product of Currency Union/Board and Real GDP*		1.2 (.35)				.25 (.27)		
Inner Product of Currency Union/Board and (Real GDP/Distance)**			2.3 (.88)				.01 (.3)	
Inner Product of Currency Union/Board and [(Real GDP/Dist.)*√Real GDP /cap]***				.19 (.08)				.16 (3.3)
Test for Joint Significance of both CU/CB terms (p-value)		.00	.00	.00		.50	.99	.99
Number of Observations	115	108	108	108	106	102	102	102
R²	.07	.18	.15	.15	.92	.92	.92	.92
RMSE	1.04	.99	1.01	1.01	.32	.32	.33	.33

Regressand is log of Real GDP/capita in 1990, PWT.

OLS. Controls, and intercepts not reported. Robust standard errors recorded in parentheses.

* Coefficient and standard error multiplied by e^{10}

** Coefficient and standard error multiplied by e^7

*** Coefficient and standard error multiplied by e^{10}

Table 4: Estimated Effects of "Dollarization" and Euro-adoption on Trade and Output**Predicted Effects of Dollarization and Euro-adoption on Trade and Output
(Selected countries)**

	% '95 Trade with:		'95 Trade (% GDP)	Potential Effects (% GDP) of:			
	\$ Zone	€ Zone		Dollarization		Joining EMU	
				On Trade	On GDP	On Trade	On GDP
Albania	3	75	47	3	1	70	23
Belize	44	8	103	90	30	16	5
Brazil	23	24	15	7	2	7	2
Canada	76	5	73	111	36	8	3
Chile	21	17	55	24	8	19	6
Costa Rica	53	17	86	91	30	30	10
Cote d'Ivoire	7	73	77	11	4	112	37
Denmark	4	49	64	6	2	63	21
Ecuador	45	16	58	53	17	19	6
Egypt Arab Rep.	18	38	53	19	6	41	13
El Salvador	50	14	59	59	19	16	5
Fiji	10	4	115	22	7	9	3
Guatemala	44	10	45	39	13	9	3
Honduras	52	17	91	95	31	31	10
Hungary	4	71	76	6	2	107	35
Israel	25	38	69	34	11	52	17
Korea	22	11	67	30	10	14	5
Kuwait	19	24	104	39	13	51	17
Mexico	79	6	59	93	31	7	2
New Zealand	13	11	59	16	5	13	4
Nigeria	35	34	30	21	7	21	7
Norway	6	43	70	9	3	61	20
Philippines	24	10	81	39	13	16	5
Poland	3	60	50	3	1	61	20
Singapore	16	10	356	114	38	71	24
South Africa	10	29	50	10	3	29	10
St. Kitts and Nevis	21	2	123	51	17	6	2
Sweden	8	48	76	12	4	72	24
Switzerland	8	61	66	11	3	81	27
Thailand	14	13	90	25	8	23	8
Turkey	9	46	44	8	3	41	13
United Kingdom	12	53	58	13	4	62	20
Zimbabwe	4	21	91	8	3	38	13
Average (whole sample)	4	48	69	5	2	54	18

Notes

1: Currency Union predicted to triple trade.

2: Each percentage point in trade/GDP predicted to increase real GDP per capita by .33%.

3: The set of countries reported here are some for which the currency decision is of particular interest.
For the full set of countries, see Table 4 in the working paper.

Table A1: Currency Unions in the Bilateral Trade Data Set

Australia

Kiribati
Nauru
Tuvalu

Denmark

Faroe Islands (part of Denmark)
Greenland (part of Denmark)

EECA

Anguilla (territory of UK)
Antigua and Barbuda
Dominica
Grenada
Montserrat (territory of UK)
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenadines

France

French Guiana (overseas department)
French Polynesia (overseas territory)
Guadeloupe (OD)
Martinique (OD)
Mayotte (territorial collectivity)
New Caledonia (OT)
Reunion (OD)
Saint Pierre and Miquelon (TC)

New Zealand

Cook Islands (self-governing)
Niue (self-governing)

CFA

Benin
Burkina Faso
Cameroon
Central African Republic
Chad
Comoros
(Republic of) Congo
Cote d'Ivoire
Gabon
Guinea-Bissau
Mali (post '84)
Niger
Senegal
Togo

UK

Falkland Islands (territory)
Gibraltar (territory)
Saint Helena (territory)
Ireland (pre '79)

USA

US Virgin Islands (territory)
British Virgin Islands (territory of UK)
Turks & Caicos Isl. (territory of UK)
Bahamas
Bermuda (colony of UK)
Liberia
Panama
Barbados (? 2:1)
Belize (? 2:1)

Sensitivity Analysis

The Effect of Openness on GDP/Capita, without Controls

	Default	Drop S, HK				
Openness	1.61 (.52)	4.1 (1.1)	1.28 (.27)	1.13 (.22)	1.23 (.33)	.68 (.23)
Log Distance from Equator			.58 (.09)			
Tropical Dummy				-1.62 (.15)		
Latin Dummy					-.50 (.20)	
East Asian Dummy					-1.14 (.30)	
Sub-Saharan Dummy					-1.60 (.19)	
Institutions						3.11 (.23)
Number of Observations	110	108	110	106	110	91
R ²			.35	.55	.49	.56
RMSE	1.08	1.30	.88	.75	.78	.71

The Effect of Openness on GDP/Capita, with Factor Accumulation Controls

	Default	Drop S, HK				
Openness	.43 (.10)	.53 (.28)	.43 (.10)	.45 (.10)	.36 (.12)	.38 (.10)
Log Distance from Equator			.01 (.04)			
Tropical Dummy				-.18 (.09)		
Latin Dummy					-.15 (.10)	
East Asian Dummy					.08 (.19)	
Sub-Saharan Dummy					-.18 (.11)	
Institutions						.22 (.23)
Number of Observations	102	100	102	101	102	89
R ²			.94	.94	.94	.94
RMSE	.28	.30	.28	.28	.28	.28

IV estimation;

Regressand is log of Real GDP/capita in 1990, PWT.

Intercepts not reported.

Robust standard errors reported in parentheses

