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DOES A CURRENCY UNION AFFECT TRADE? THE TIME SERIES EVIDENCE

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Does a Currency Union Affect Trade? The Time Series Evidence
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ABSTRACT

Does leaving a currency union reduce international trade? We answer this question using a large annual panel data set covering 217 countries from 1948 through 1997. During this sample a large number of countries left currency unions; they experienced economically and statistically significant declines in bilateral trade, after accounting for other factors. Assuming symmetry, we estimate that a pair of countries that starts to use a common currency experiences a doubling in bilateral trade.

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"The direct benefits [of EMU] … in the form of reduced transactions costs and reduced uncertainty, possibly including additional transparency in competition … are likely to be small …" Wyplosz (1997)

"It is clear … that the European Commission's (1991) claim … that the integration of product and factor markets in Europe requires a single currency has no basis in either theory or experience." Feldstein (1997)

"Contrary to widespread belief, EMY is not about lower transactions costs in cross-border operations, or about lower hedging costs, and all the other relatively petty reasons that have been invoked in its defense." Münchau Financial Times May 28, 1997.

1: Introduction

In this short paper we ask the question "What is the effect of currency union[1] membership on international trade?" Since an increase in trade prompted by currency union would be an unexpected benefit of European Monetary Union (EM) or dollarization, this is an interesting question to both policy-makers and academics.

Rose (2000) estimated this effect using an essentially cross-sectional approach. He used data for a large number of countries between 1970 and 1990 and found that bilateral trade was higher for a pair of countries that used the same currency than for a pair of countries with their own sovereign monies. More precisely, the coefficient (denoted γ) on a currency union (CU) dummy in an empirical model of bilateral trade was found to be positive and significant in both economic and statistical terms. Its value rarely fell below 1.2, implying an effect of currency union on trade of around ($e^{1.2} \approx$) 300%. This was true even after controlling for a number of other factors, which might affect trade through the "gravity" model. The latter states that trade between a pair of countries is proportional to their combined incomes, and inversely proportional to the distance between them.

There are a number of potential issues with the cross-sectional approach. Most importantly, the policy question of interest is the (time series) question "What is the trade effect of a country joining (or leaving) a currency union?" not the cross-sectional question "How much more do countries within currency unions trade than non-members?" Other possible problems

are econometric; for instance, pair-specific "fixed effects" may obscure the econometric estimates.

In this paper, we estimate the effect of currency unions on trade exploiting time series (as well as cross-sectional) variation.[2] We use a data set that covers a large number of countries for fifty post-war years. During this sample, a large number of currency unions dissolved, allowing us to use both time series and cross-sectional variation on currency union incidence. In particular, we use the fact that over one hundred country-pairs dissolved common currency linkages during the sample. By comparing their trade before and after this regime change (holding other effects constant), we can estimate the effect of currency union membership on trade.

Reassuringly, we find that our results are basically consistent with those of Rose (2000). We find an economically and statistically significant effect of currency unions on trade using a number of different panel estimation techniques. Our estimate is that bilateral trade rises/falls by about 100% as a pair of countries forms/dissolves a currency union, *ceteris paribus*.

In section 2, we describe the data set and methodology that we use. Section 3 is the heart of the paper, and presents estimation results of the effect of currency union on trade. After some sensitivity analysis, the paper concludes with a brief summary.

2: Methodology and Data

Gravity Methodology

We are interested in estimating the effect of currency unions on international trade. Towards that end, we estimate a conventional gravity model of international trade.[3] We augment the model with a number of extra controls:

$$\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j)_t + \beta_3 \ln D_{ij} + \beta_4 Lang_{ij} + \beta_5 Cont_{ij} + \beta_6 FTA_{ijt}$$
$$+ \beta_7 Landl_{ij} + \beta_8 Island_{ij} + \beta_9 \ln(Area_i Area_j) + \beta_{10} ComCol_{ij} + \beta_{11} CurCol_{ijt}$$
$$+ \beta_{12} Colony_{ij} + \beta_{13} ComNatij + \gamma CU_{ijt} + \varepsilon_{ijt}$$

where i and j denotes countries, t denotes time, and the variables are defined as:

- X_{ijt} denotes the average value of real bilateral trade between i and j at time t,
- Y is real GDP,
- Pop is population,
- D is the distance between i and j,
- Lang is a binary variable which is unity if i and j have a common language,
- Cont is a binary variable which is unity if i and j share a land border,
- FTA is a binary variable which is unity if i and j belong to the same regional trade agreement,
- Landl is the number of landlocked countries in the country-pair (0, 1, or 2).
- Island is the number of island nations in the pair (0, 1, or 2),
- Area is the land mass of the country,
- ComCol is a binary variable which is unity if i and j were ever colonies after 1945 with the same colonizer,
- CurCol is a binary variable which is unity if i and j are colonies at time t,
- Colony is a binary variable which is unity if i ever colonized j or *vice versa*,
- ComNat is a binary variable which is unity if i and j remained part of the same nation during the sample (e.g., France and Guadeloupe, or the UK and Bermuda),
- CU is a binary variable which is unity if i and j use the same currency at time t,
- β is a vector of nuisance coefficients, and
- ε_{ij} represents the myriad other influences on bilateral exports, assumed to be well behaved.

The coefficient of interest to us is γ, the effect of a currency union on trade.

We estimate the model with a number of techniques below. We follow the norm in the literature by using ordinary least squares, albeit with standard errors which are robust to clustering (since pairs of countries are likely to be highly dependent across years). However, the force of the paper rests in employing a number of panel data techniques. We use both fixed and random effects estimators extensively below. We rely on the robust fixed effects "within" estimator, which essentially adds a set of country-pair specific intercepts to the equation, and thus exploits only the time series dimension of the data set around country-pair averages.

The Data Set

Rose (2000) exploited a large data set originally developed by the United Nations, covering 186 countries from 1970 through 1990. In this paper we instead use the CD-ROM "Direction of Trade" (DoT) data set developed by the International Monetary Fund (IMF).

The DoT data set covers bilateral trade between 217 IMF country codes between 1948 and 1997 (with many gaps). Not all of the areas covered are countries in the conventional sense of the word; colonies (e.g., Bermuda), dependencies (e.g., Guernsey), territories (e.g., Guam), overseas departments (e.g., Guadeloupe), countries that gained their independence (e.g., Guinea-Bissau), and so forth are all included. We use the term "country" simply for convenience. (The countries are listed in Appendix 1.) Bilateral trade on FOB exports and CIF imports is recorded in American dollars; we deflate trade by the American CPI.[4] We create an average value of bilateral trade between a pair of countries by averaging all of the four possible measures potentially available.[5]

To this data set, we add a number of other variables that are necessary to estimate the gravity model. We add population and real GDP data (in constant dollars) from three sources. Wherever possible, we use "World Development Indicators" (taken from the World Bank's WDI 2000 CD-ROM) data. When the data are unavailable from the World Bank, we fill in missing observations with comparables from the Penn World Table Mark 5.6, and (when all else fails), from the IMF's "International Financial Statistics".[6] The series have been checked and corrected for errors.

We exploit the CIA's "World Factbook" for a number of country-specific variables. These include: latitude and longitude, land area, landlocked and island status, physically contiguous neighbors, language, colonizers, and dates of independence.[7] We use these to create great-circle distance and our other controls. We obtain data from the World Trade Organization to create an indicator of regional trade agreements, and include: EEC/EC/EU; US-Israel FTA; NAFTA; CARICOM; PATCRA; ANZCERTA; and Mercosur.[8]

Finally, we add information on whether the pair of countries was involved in a currency union. By "currency union" we mean essentially that money was interchangeable between the two countries at a 1:1 par for an extended period of time, so that there was no need to convert prices when trading between a pair of countries. Our basic source for currency union data is the

IMF's *Schedule of Par Values* and issues of the IMF's *Annual Report on Exchange Rate Arrangements and Exchange Restrictions*. We supplement this with information from annual copies of *The Statesman's Yearbook*. In the data set, about 1% of the sample covers currency unions, a proportion comparable to that in Rose, 2000). The currency unions in our data set are tabulated in Appendix 2. A number of currency unions are sufficiently integrated that trade data are unavailable; this will tend to bias our estimate of γ downwards.[9]

During the sample there were 16 switches into and 130 switches out of currency unions. Some of these were related (e.g., Bermuda's switch from the pound sterling to the American dollar), and a number are cross-sectionally dependent (e.g., Equatorial Guinea entered the CFA franc zone and so joined a currency union vis-à-vis many countries simultaneously). But while we do not have 146 independent observations on regime transitions, the number is still substantive. Since we do not have many observations on currency union entries, we treat exits from and entries into currency unions symmetrically. Our techniques exploit this time series feature of the data.[10]

Descriptive statistics for the data set are tabulated in Table 1 for both currency unions and non-unions. Sample means for the key gravity regressors are broadly similar for currency unions and non-unions, the exception being the common language and colonial variables.

3: Gravity-Based Estimates of the Effect of Currency Unions on Trade

OLS Estimates

We begin by estimating our gravity equation using conventional OLS (with a full set of year-specific intercepts added). Results are presented in Table 2.

The gravity model works well in a number of different dimensions. The model fits the data well, explaining almost two-thirds of the variation in bilateral trade flows. The gravity coefficients are economically and statistically significant with sensible interpretations. For instance, economically larger and richer countries trade more; more distant countries trade less. A common language, land border and membership in a regional trade agreement encourage trade, as does a common colonial history. The same nation coefficient is not intuitively signed but is statistically indistinguishable from zero.

The model delivers a γ estimate of 1.41, an estimate that is comparable to and slightly *higher* (in both economic and statistical significance) than that of Rose (2000). The estimate

implies that a pair of countries that are joined by a common currency trade about four times as much with each other ($e^{1.4} \approx 4.06$), holding other things constant.

It is possible to perform extensive robustness analysis for gravity estimates like those in Table 2. For instance, we have estimated the model using only the cross-sectional aspects of the model, ignoring the time series features of our panel data set. When we do this, we find that γ remains economically and statistically large when estimated on individual years; results are in Table 3. However, instead of pursuing that tack, we now make the most of the time series variation in our panel data set.

Fixed Effects Estimates

The fixed effect "within" estimator is the most appropriate way to exploit the panel nature of the data set without making heroic assumptions. It estimates γ by comparing trade for a pair of countries before CU creation/dissolution to trade for the same pair of countries after CU creation/dissolution. There are only two possible drawbacks to the estimator: the impossibility of estimating time-invariant factors, and a potential lack of efficiency. Since our data set is large, we are prepared to ignore the latter problem. Since γ can manifestly (as will be shown below) be estimated from the time series variation in currency union incidence, the former problem does not arise.

Above and beyond econometric robustness, the fixed effect estimator has one enormous advantage. Since the within estimator exploits variation over time, *it answers the policy question of interest*, namely the (time series) question "What is the trade effect of a country joining (or leaving) a currency union?" This can be contrasted with the cross-sectional question "How much more do countries within currency unions trade than non-members?" which was answered by Rose (2000).

Estimation results are in Table 4. We present the fixed effects estimates of γ and a few of the key gravity coefficients in the left-hand column. For comparison, we also tabulate random effects estimates, using a generalized least squares estimator assuming Gaussian disturbances that are uncorrelated with the random (country-pair specific) effects. The "between" estimator (which essentially runs a regression on group averages) and a normal maximum likelihood estimator are also shown at the right-hand side of the table.

The fixed effects estimate of γ is smaller than the OLS estimates of Table 2 and 3. Since $e^{.74} \approx 2.1$, the estimate implies that leaving/joining a currency union leads bilateral trade to fall/rise by about 100%. But this effect is still economically large, and statistically significant at conventional levels; the t-statistic is over thirteen. The other estimators generate even bigger estimates of γ. And while the nuisance (β) coefficients vary between fixed and random effects, the estimate of γ is reasonably robust.

Sensitivity Analysis

In Table 5, we provide some sensitivity analysis. We perturb our basic methodology in a number of different ways, and tabulate estimates of γ using both fixed and random effects estimators. In particular: 1) we add a comprehensive set of year-specific controls; 2) instead of using all years of the sample, we use only the data from every fifth year; 3) we add quadratics of both output and output per capital; 4) we throw out all industrial country observations (those with IFS country codes over 200); 5) we throw out all small country observations (those with GDP<$1 billion); 6) we throw out all poor countries (those with real GDP per capita less than $1,000); 7) we retain only similarly-sized country-pairs (i.e., those with GDPs which differ by less than a factor of five); 8) we retain only country-pairs where bilateral trade is a small fraction (less than 10%) of total trade for both countries; 9) we retain only pre-1974 observations; 10) we throw out all CFA-Franc observations; and 11) we throw out all ECCB observations, as well as those which involve the American dollar, the British pound sterling, or the French Franc.[11]

The results of Table 5 show that γ is reasonably insensitive to a number of different perturbations in our methodology. Our fixed effects estimates lie in the relatively narrow range of (.53, 1.03) and are consistent economically and statistically significant throughout. They are also consistent close to the random effects estimates of γ.[12] Other estimators (such as the panel estimator tabulated in Table 2, the between and maximum likelihood estimators tabulated in Table 4) show even higher estimates.[13]

To summarize: a number of different panel estimators all deliver the conclusion that currency union has a strong positive effect on trade. We rely most on the fixed effects estimator since by essentially exploiting the time series variation in currency union arrangements, it is least demanding in terms of heroic econometric assumptions. Our fixed effects estimates indicate that entry into/departure from a currency union leads bilateral trade to rise/fall by about 100%,

holding a host of other features constant. This result is not only economically and statistically significant, but seems relatively robust.

Caveats

There are issues associated with the applicability of our results. Since our sample ends before EMU, most of the currency unions involved countries that were either small, poor, or both; our results may therefore be inapplicable to EMU. On the other hand, they may be highly relevant to the many small and/or poor countries considering "dollarization". Rose and van Wincoop (2001) attack these issues using a more structural approach that allows for trade diversion and multilateral spillover effects.

In addition, we treat currency unions as exogenous with respect to trade. There are a number of reasons to believe this assumption, since there is little evidence that countries have joined currency unions to increase trade. Nevertheless, some of the apparently large trade-creating effects of currency union may actually be a reflection of reverse causality. Rose (2000) and López-Córdova and Meissner (2001) provide evidence that the effect of monetary union on trade seems high even after accounting for potential endogeneity; Persson (2001) provides counter-arguments. But while we doubt the importance of this in practice, we have been unable to devise a convincing set of instrumental variables while would allow us to quantify this effect.

4. Conclusion

In this paper we used a large panel data set to estimate the time series effect of currency union on trade. Our data set includes annual bilateral trade between over 230 countries from 1948 through 1997. During this period of time, a number of countries joined or (mostly) left currency unions. Controlling for a host of other influences through an augmented gravity model, we find that a pair of countries which joined/left a currency union experienced a doubling in trade. This result is economically large, statistically significant, and seems insensitive to a number of perturbations in our methodology.

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Table 1: Descriptive Statistics

	Non-Unions	Currency Unions
Observations	422,987	4,255
Log Real Trade	10.7 (3.7)	10.5 (3.1)
Log Distance	8.2 (.8)	7.1 (1.0)
Log product GDP	47.9 (2.6)	44.7 (3.0)
Log product GDP/capita	16.1 (1.4)	14.4 (1.6)
Common Language Dummy	.15 (.35)	.85 (.36)
Land Border Dummy	.02 (.14)	.18 (.38)
Regional Trade Agreement	.01 (.08)	.07 (.26)
Number Landlocked	.23 (.45)	.35 (.57)
Number Islands	.35 (.54)	.43 (.70)
Log Product Land Areas	23.8 (3.6)	23.3 (4.3)
Common Colonizer	.06 (.23)	.68 (.47)
Current Colony	.002 (.04)	.16 (.36)
Ever Colony	.01 (.11)	.22 (.41)
Same Nation	.001 (.02)	.08 (.28)

Means, with standard deviations reported in parentheses

Table 2: Pooled Panel OLS Gravity Estimates

Currency Union	1.41 (.13)
Log Distance	-1.11 (.02)
Log Product Real GDPs	.93 (.01)
Log Product Real GDP/capita	.45 (.02)
Common Language	.37 (.04)
Common Land Border	.40 (.12)
Regional Trade Agreement	1.01 (.13)
Number Landlocked	-.15 (.03)
Number Islands	.07 (.04)
Log Product Land Areas	-.10 (.01)
Common Colonizer	.24 (.07)
Current Colony	.77 (.26)
Ever Colony	1.25 (.13)
Same Nation	-.24 (1.05)
Observations	219,558
R^2	.64
RMSE	2.02

Intercept and year controls not recorded.
Standard errors robust to country-pair clustering recorded in parentheses.
Annual data for 231 countries, 1948-1997.

Table 3: Cross-Sectional OLS Gravity Estimates of the Currency Union Effect

Year	γ (se)
1950	.98 (.32)
1955	1.05 (.26)
1960	.70 (.19)
1965	.85 (.15)
1970	1.38 (.21)
1975	1.36 (.23)
1980	1.28 (.23)
1985	1.90 (.23)
1990	2.48 (.25)
1995	1.61 (.23)

Controls not reported: distance, output, output per capita, language, land border, FTA, landlocked, islands, land area, common colonizer, current colony, ever colony, same nation, and constant.
Standard errors recorded in parentheses.
Annual data for 231 countries.

Table 4: Pooled Panel Gravity Estimates

	Fixed effects ("within")	Random effects GLS	Between Estimator	Maximum Likelihood
Currency Union	.74 (.05)	.82 (.05)	1.57 (.24)	.80 (.05)
Log Distance		-1.35 (.03)	-1.42 (.03)	-1.36 (.04)
Log Product Real GDPs	.05 (.01)	.27 (.01)	.98 (.01)	.23 (.01)
Log Product Real GDP/capita	.79 (.01)	.52 (.01)	.45 (.02)	.57 (.01)
Common Language		.29 (.06)	.43 (.06)	.27 (.07)
Common Land Border		.52 (.16)	.48 (.17)	.53 (.19)
R^2: Within	.12	.12	.11	
R^2: Between	.23	.52	.63	
R^2: Overall	.23	.47	.58	
Hausman Test (p-value)		.00		

219,558 observations in 11,178 country-pair groups. Obs per group within [1,50], mean=19.6.
Intercepts not recorded. Other controls not recorded: a) regional FTA membership, b) # landlocked; c) # islands; d) area; e) common colonizer; f) current colony/colonizer; g) ever colony/colonizer; h) common country.
Standard errors in parentheses.
Annual data for 231 countries, 1948-1997.

Table 5: Sensitivity Analysis of the Panel Currency Union Effect

	Fixed effects ("within")	**Random effects GLS**
Year Controls	.67 (.05)	.67 (.05)
Data at Five-Year Intervals	.87 (.12)	1.00 (.11)
Quadratic Output Terms Added	.66 (.05)	.73 (.05)
No Industrial Countries	.79 (.08)	.87 (.08)
No Small Countries	.79 (.06)	.88 (.06)
No Poor Countries	.67 (.08)	.73 (.08)
Similarly-Size Countries	.96 (.09)	1.05 (.09)
Countries with Unimportant Bilateral Trade	.78 (.06)	.86 (.06)
No Pre-1970 Observations	.53 (.09)	.65 (.09)
No CFA Observations	.69 (.06)	.80 (.06)
No ECCB/American Dollar/French Franc/British Pound Observations	.86 (.07)	.93 (.07)

Controls not reported: distance, output, output per capita, language, land border, FTA, landlocked, islands, land area, common colonizer, current colony, ever colony, same nation, and constant.
Standard errors in parentheses.
Annual data, 1948-1997.

Appendix 1: Countries in Sample

Afghanistan
Albania
Algeria
American Samoa
Angola
Anguilla
Antigua and Barbuda
Argentina
Armenia
Aruba
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bermuda
Bhutan
Bolivia
Bosnia & Herzegovina
Botswana
Brazil
Brunei Darussalam
Bulgaria
Burkina Faso
Burma (Myanmar)
Burundi
Cambodia
Cameroon
Canada
Cape Verde
Cayman Islands
Central African Rep.
Chad
Chile
China
Colombia
Comoros
Congo, Dem. Rep. of (Zaire)
Congo, Rep. of
Costa Rica
Cote D'Ivorie (Ivory Coast)
Croatia
Cuba
Cyprus
Czech Republic
Czechoslovakia
Denmark
Djibouti
Dominica
Dominican Rep.
Eastern Germany
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Estonia
Ethiopia
Faeroe Islands
Falkland Islands
Fiji
Finland
France
French Guiana
French Polynesia
Gabon
Gambia
Georgia
Germany
Ghana
Gibraltar
Greece
Greenland
Grenada
Guadeloupe
Guam
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kazakhstan
Kenya
Kiribati
Korea, North
Korea, South (R)
Kuwait
Kyrgyz Republic
Lao People's Dem. Rep.
Latvia
Lebanon
Lesotho
Liberia
Libya
Lithuania
Luxembourg
Macao
Macedonia
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Martinique
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Montserrat
Morocco
Mozambique
Namibia
Nauru
Nepal
Netherlands
Netherlands Antilles
New Caledonia
New Zealand
Nicaragua
Niger
Nigeria
Norway
Oman
Pakistan
Panama
Papua N.Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Reunion
Romania
Russia
Rwanda
Samoa

Sao Tome & Principe
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Slovak Republic
Slovenia
Solomon Islands
Somalia
Somaliland, British
South Africa
Spain
Spanish Sahara
Sri Lanka
St. Helena
St. Kitts&Nevis
St. Pierre&Miquelon
St.Lucia
St.Vincent & Gren.
Sudan
Suriname
Swaziland
Sweden
Switzerland
Syria
Tajikistan
Tanzania
Thailand
Timor
Togo
Tonga
Trinidad&Tobago
Tunisia
Turkey
Turkmenistan
Tuvalu
U.S.S.R.
Uganda
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Wake Islands
Wallis & Futuna
West Bank/Gaza Strip
Yemen Arab Rep.
Yemen, P.D.R.
Yemen, Republic Of
Yugoslavia, Fr
(Serbia/Montenegro)
Yugoslavia, Socialist Fed. Rep.
Zambia
Zimbabwe

Appendix 2: Currency Unions in Sample

Currency Union Members		End
Antigua And Barbuda	Barbados	1975
Antigua And Barbuda	Dominica	ongoing
Antigua And Barbuda	Grenada	ongoing
Antigua And Barbuda	Guyana	1971
Antigua And Barbuda	Montserrat	ongoing
Antigua And Barbuda	St. Kitts&Nevis	ongoing
Antigua And Barbuda	St.Lucia	ongoing
Antigua And Barbuda	St.Vincent&Gren	ongoing
Antigua And Barbuda	Trinidad&Tobago	1976
Aruba	Netherlands Antilles	ongoing
Aruba	Suriname	1994
Australia	Kiribati	ongoing
Australia	Nauru	ongoing
Australia	Solomon Islands	1979
Australia	Tonga	1991
Australia	Tuvalu	ongoing
Bangladesh	India	1974
Barbados	Dominica	1975
Barbados	Grenada	1975
Barbados	Guyana	1971
Barbados	Montserrat	1975
Barbados	St. Kitts&Nevis	1975
Barbados	St.Lucia	1975
Barbados	St.Vincent&Gren	1975
Barbados	Trinidad&Tobago	1975
Belgium	Burundi	1964
Belgium	Congo, Dem. Rep. Of (Zaire)	1961
Belgium	Rwanda	1966
Belgium-Luxembourg	Burundi	1964
Belgium-Luxembourg	Congo, Dem. Rep. Of (Zaire)	1961
Belgium-Luxembourg	Rwanda	1966
Benin	Burkina Faso	ongoing
Benin	Cote D'ivorie (Ivory Coast)	ongoing
Benin	Equatorial Guinea	ongoing
Benin	Gabon	ongoing
Benin	Guinea	1969
Benin	Guinea-Bissau	ongoing
Benin	Madagascar	1982
Benin	Mali	ongoing
Benin	Mauritania	1974
Benin	Niger	ongoing
Benin	Reunion	1976
Benin	Senegal	ongoing
Benin	Togo	ongoing
Bhutan	India	ongoing
Bhutan	Pakistan	1966
Botswana	Lesotho	1977
Botswana	Swaziland	1977
Brunei Darussalam	Malaysia	1971
Brunei Darussalam	Singapore	ongoing
Burma(Myanmar)	India	1966
Burma(Myanmar)	Pakistan	1971
Cameroon	Benin	ongoing
Cameroon	Burkina Faso	ongoing
Cameroon	Central African Rep.	ongoing
Cameroon	Chad	ongoing
Cameroon	Comoros	1994
Cameroon	Congo, Rep. Of	ongoing
Cameroon	Cote D'ivorie (Ivory Coast)	ongoing
Cameroon	Equatorial Guinea	ongoing
Cameroon	Gabon	ongoing
Cameroon	Guinea	1969
Cameroon	Guinea-Bissau	ongoing
Cameroon	Madagascar	1982
Cameroon	Mali	ongoing
Cameroon	Mauritania	1974
Cameroon	Niger	ongoing
Cameroon	Reunion	1976
Cameroon	Senegal	ongoing
Cameroon	Togo	ongoing
Central African Rep.	Benin	ongoing
Central African Rep.	Burkina Faso	ongoing
Central African Rep.	Chad	ongoing
Central African Rep.	Comoros	1994
Central African Rep.	Congo, Rep. Of	ongoing
Central African Rep.	Cote D'ivorie (Ivory Coast)	ongoing
Central African Rep.	Equatorial Guinea	ongoing
Central African Rep.	Gabon	ongoing
Central African Rep.	Guinea	1969
Central African Rep.	Guinea-Bissau	ongoing
Central African Rep.	Madagascar	1982
Central African Rep.	Mali	ongoing
Central African Rep.	Mauritania	1974
Central African Rep.	Niger	ongoing
Central African Rep.	Reunion	1976
Central African Rep.	Senegal	ongoing
Central African Rep.	Togo	ongoing
Chad	Benin	ongoing
Chad	Burkina Faso	ongoing
Chad	Comoros	1994
Chad	Congo, Rep. Of	ongoing

Chad	Cote D'ivorie (Ivory Coast)	ongoing	Cote D'ivorie (Ivory Coast)	Togo	ongoing
Chad	Equatorial Guinea	ongoing	Denmark	Faeroe Islands	ongoing
Chad	Gabon	ongoing	Denmark	Greenland	ongoing
Chad	Guinea	1969	Djibouti	Benin	1949
Chad	Guinea-Bissau	ongoing	Djibouti	Burkina Faso	1949
Chad	Madagascar	1982	Djibouti	Cameroon	1949
Chad	Mali	ongoing	Djibouti	Central African Rep.	1949
Chad	Mauritania	1974	Djibouti	Chad	1949
Chad	Niger	ongoing	Djibouti	Comoros	1949
Chad	Reunion	1976	Djibouti	Congo, Rep. Of	1949
Chad	Senegal	ongoing	Djibouti	Cote D'ivorie (Ivory Coast)	1949
Chad	Togo	ongoing	Djibouti	Gabon	1949
Comoros	Benin	1994	Djibouti	Guinea	1949
Comoros	Burkina Faso	1994	Djibouti	Madagascar	1949
Comoros	Congo, Rep. Of	1994	Djibouti	Mali	1949
Comoros	Cote D'ivorie (Ivory Coast)	1994	Djibouti	Mauritania	1949
Comoros	Equatorial Guinea	1994	Djibouti	Niger	1949
Comoros	Gabon	1994	Djibouti	Reunion	1949
Comoros	Guinea	1969	Djibouti	Senegal	1949
Comoros	Madagascar	1982	Djibouti	Togo	1949
Comoros	Mali	1994	Dominica	Grenada	ongoing
Comoros	Mauritania	1974	Dominica	Guyana	1971
Comoros	Niger	1994	Dominica	Montserrat	ongoing
Comoros	Reunion	1976	Dominica	St. Kitts&Nevis	ongoing
Comoros	Senegal	1994	Dominica	St.Lucia	ongoing
Comoros	Togo	1994	Dominica	St.Vincent&Gren	ongoing
Congo, Rep. Of	Benin	ongoing	Dominica	Trinidad&Tobago	1976
Congo, Rep. Of	Burkina Faso	ongoing	Equatorial Guinea	Burkina Faso	ongoing
Congo, Rep. Of	Cote D'ivorie (Ivory Coast)	ongoing	Equatorial Guinea	Cote D'ivorie (Ivory Coast)	ongoing
Congo, Rep. Of	Equatorial Guinea	ongoing	Equatorial Guinea	Gabon	ongoing
Congo, Rep. Of	Gabon	ongoing	Equatorial Guinea	Guinea-Bissau	ongoing
Congo, Rep. Of	Guinea	1969	Equatorial Guinea	Mali	ongoing
Congo, Rep. Of	Guinea-Bissau	ongoing	Equatorial Guinea	Niger	ongoing
Congo, Rep. Of	Madagascar	1982	Equatorial Guinea	Senegal	ongoing
Congo, Rep. Of	Mali	ongoing	Equatorial Guinea	Togo	ongoing
Congo, Rep. Of	Mauritania	1974	France	Algeria	1969
Congo, Rep. Of	Niger	ongoing	France	French Guiana	ongoing
Congo, Rep. Of	Reunion	1976	France	Guadeloupe	ongoing
Congo, Rep. Of	Senegal	ongoing	France	Martinique	ongoing
Congo, Rep. Of	Togo	ongoing	France	Morocco	1959
Cote D'ivorie (Ivory Coast)	Burkina Faso	ongoing	France	Reunion	ongoing
Cote D'ivorie (Ivory Coast)	Madagascar	1982	France	St. Pierre&Miquelon	ongoing
Cote D'ivorie (Ivory Coast)	Mali	ongoing	France	Tunisia	1958
Cote D'ivorie (Ivory Coast)	Mauritania	1974	Gabon	Burkina Faso	ongoing
Cote D'ivorie (Ivory Coast)	Niger	ongoing	Gabon	Cote D'ivorie (Ivory Coast)	ongoing
Cote D'ivorie (Ivory Coast)	Reunion	1976	Gabon	Guinea	1969
Cote D'ivorie (Ivory Coast)	Senegal	ongoing	Gabon	Guinea-Bissau	ongoing

Gabon	Madagascar	1982	Madagascar	Burkina Faso	1982
Gabon	Mali	ongoing	Madagascar	Mali	1982
Gabon	Mauritania	1974	Madagascar	Mauritania	1974
Gabon	Niger	ongoing	Madagascar	Niger	1982
Gabon	Reunion	1976	Madagascar	Reunion	1976
Gabon	Senegal	ongoing	Madagascar	Senegal	1982
Gabon	Togo	ongoing	Madagascar	Togo	1982
Gambia	Ghana	1965	Malawi	Zambia	1967
Gambia	Nigeria	1967	Malawi	Zimbabwe	1967
Gambia	Sierra Leone	1965	Malaysia	Singapore	1971
Ghana	Nigeria	1965	Maldives	Mauritius	1967
Ghana	Sierra Leone	1965	Maldives	Pakistan	1971
Grenada	Guyana	1971	Mali	Burkina Faso	ongoing
Grenada	Montserrat	ongoing	Mali	Mauritania	1974
Grenada	St. Kitts&Nevis	ongoing	Mali	Niger	ongoing
Grenada	St.Lucia	ongoing	Mali	Reunion	1976
Grenada	St.Vincent&Gren	ongoing	Mali	Senegal	ongoing
Grenada	Trinidad&Tobago	1976	Mali	Togo	ongoing
Guinea	Burkina Faso	1969	Mauritania	Burkina Faso	1974
Guinea	Cote D'ivorie (Ivory Coast)	1969	Mauritania	Niger	1974
Guinea	Madagascar	1969	Mauritania	Reunion	1974
Guinea	Mali	1969	Mauritania	Senegal	1974
Guinea	Mauritania	1969	Mauritania	Togo	1974
Guinea	Niger	1969	Mauritius	Seychelles	1976
Guinea	Reunion	1969	Montserrat	St. Kitts&Nevis	ongoing
Guinea	Senegal	1969	Montserrat	St.Lucia	ongoing
Guinea	Togo	1969	Montserrat	St.Vincent&Gren	ongoing
Guinea-Bissau	Burkina Faso	ongoing	Montserrat	Trinidad&Tobago	1976
Guinea-Bissau	Cote D'ivorie (Ivory Coast)	ongoing	Netherlands Antilles	Suriname	1994
Guinea-Bissau	Mali	ongoing	New Caledonia	French Polynesia	ongoing
Guinea-Bissau	Niger	ongoing	New Caledonia	Vanuatu	1971
Guinea-Bissau	Senegal	ongoing	New Caledonia	Wallis & Futuna	ongoing
Guinea-Bissau	Togo	ongoing	New Zealand	Samoa	1967
Guyana	Montserrat	1971	Niger	Burkina Faso	ongoing
Guyana	St. Kitts&Nevis	1971	Niger	Reunion	1976
Guyana	St.Lucia	1971	Niger	Senegal	ongoing
Guyana	St.Vincent&Gren	1971	Niger	Togo	ongoing
Guyana	Trinidad&Tobago	1971	Nigeria	Sierra Leone	1965
India	Maldives	1966	Oman	India	1970
India	Mauritius	1966	Pakistan	Mauritius	1967
India	Pakistan	1966	Pakistan	Seychelles	1967
India	Seychelles	1966	Portugal	Angola	1976
Kenya	Somalia	1971	Portugal	Cape Verde	1977
Kenya	Tanzania	1978	Portugal	Guinea-Bissau	1977
Kenya	Uganda	1978	Portugal	Mozambique	1977
Kuwait	India	1961	Portugal	Sao Tome & Principe	1977
Lesotho	Swaziland	ongoing	Qatar	India	1966

Qatar	United Arab Emirates	ongoing	United Kingdom	Iraq	1967
Reunion	Burkina Faso	1976	United Kingdom	Ireland	1979
Reunion	Senegal	1976	United Kingdom	Israel	1954
Reunion	Togo	1976	United Kingdom	Jamaica	1969
Senegal	Burkina Faso	ongoing	United Kingdom	Jordan	1967
Senegal	Togo	ongoing	United Kingdom	Kenya	1967
Somalia	Tanzania	1971	United Kingdom	Kuwait	1967
Somalia	Uganda	1971	United Kingdom	Libya	1967
South Africa	Botswana	1977	United Kingdom	Malawi	1971
South Africa	Lesotho	ongoing	United Kingdom	Malta	1971
South Africa	Swaziland	ongoing	United Kingdom	New Zealand	1967
Spain	Equatorial Guinea	1969	United Kingdom	Nigeria	1967
Sri Lanka	India	1966	United Kingdom	Oman	1971
Sri Lanka	Pakistan	1967	United Kingdom	Samoa	1967
St. Kitts&Nevis	St.Lucia	ongoing	United Kingdom	Sierra Leone	1965
St. Kitts&Nevis	St.Vincent&Gren	ongoing	United Kingdom	Somalia	1967
St. Kitts&Nevis	Trinidad&Tobago	1976	United Kingdom	South Africa	1961
St. Pierre&Miquelon	Benin	1976	United Kingdom	St. Helena	ongoing
St. Pierre&Miquelon	Burkina Faso	1976	United Kingdom	Tanzania	1967
St. Pierre&Miquelon	Cameroon	1976	United Kingdom	Uganda	1967
St. Pierre&Miquelon	Central African Rep.	1976	United Kingdom	Yemen, P.D.R.	1972
St. Pierre&Miquelon	Chad	1976	United Kingdom	Yemen, Republic Of	1972
St. Pierre&Miquelon	Comoros	1976	United Kingdom	Zambia	1967
St. Pierre&Miquelon	Congo, Rep. Of	1976	United Kingdom	Zimbabwe	1967
St. Pierre&Miquelon	Cote D'ivorie (Ivory Coast)	1976	United States	American Samoa	ongoing
St. Pierre&Miquelon	Djibouti	1949	United States	Bahamas	ongoing
St. Pierre&Miquelon	Gabon	1976	United States	Belize	1949
St. Pierre&Miquelon	Guinea	1969	United States	Bermuda	ongoing
St. Pierre&Miquelon	Madagascar	1976	United States	Dominican Rep.	1985
St. Pierre&Miquelon	Mali	1976	United States	Guam	ongoing
St. Pierre&Miquelon	Mauritania	1974	United States	Guatemala	1986
St. Pierre&Miquelon	Niger	1976	United States	Liberia	ongoing
St. Pierre&Miquelon	Reunion	1976	United States	Panama	ongoing
St. Pierre&Miquelon	Senegal	1976	Vanuatu	French Polynesia	1971
St. Pierre&Miquelon	Togo	1976	Vanuatu	Wallis & Futuna	1971
St.Lucia	St.Vincent&Gren	ongoing	Wallis & Futuna	French Polynesia	ongoing
St.Lucia	Trinidad&Tobago	1976	Yemen, P.D.R.	India	1951
St.Vincent&Gren	Trinidad&Tobago	1976	Yemen, P.D.R.	Kenya	1972
Tanzania	Uganda	1978	Yemen, P.D.R.	Somalia	1971
Togo	Burkina Faso	ongoing	Yemen, P.D.R.	Tanzania	1972
United Kingdom	Bahamas	1966	Yemen, P.D.R.	Uganda	1972
United Kingdom	Bermuda	1970	Yemen, Republic Of	India	1951
United Kingdom	Cyprus	1972	Yemen, Republic Of	Kenya	1972
United Kingdom	Falkland Islands	ongoing	Yemen, Republic Of	Somalia	1971
United Kingdom	Gambia	1971	Yemen, Republic Of	Tanzania	1972
United Kingdom	Ghana	1965	Yemen, Republic Of	Uganda	1972
United Kingdom	Gibraltar	ongoing	Zimbabwe	Zambia	1967

Appendix 3: Simple Bivariate Correlations

	Trade	Curr. Union	Distance	GDP	GDP p/c	Lang.	Border	Regional	Landlck	Island	Area	Com Col	Cur.Col	Ever Col
Curr. Union	.00													
Distance	-.17	-.19												
GDP	.67	-.15	.18											
GDP p/c	.41	-.14	.11	.38										
Language	-.01	.19	-.13	-.18	-.05									
Border	.11	.13	-.42	-.02	-.12	.12								
FTA	.08	.08	-.25	.06	.08	-.10	.08							
Landlocked	-.15	.05	-.09	-.12	-.21	-.01	.08	-.05						
Island	-.17	.00	.15	-.30	.20	.10	-.11	.08	-.19					
Area	.27	-.01	.10	.57	-.22	-.11	.10	-.13	.04	-.51				
Com. Colonizer	-.17	.28	-.16	-.33	-.21	.36	.07	.12	.03	.16	-.22			
Cur. Colony	.05	.15	.01	-.01	.01	.07	-.01	-.01	-.02	.01	-.03	-.02		
Ever Colony	.15	.08	-.02	.08	.06	.19	.03	.00	-.04	-.03	.01	-.05	.30	
Same Nation	.02	.05	.00	-.01	.02	.03	-.00	-.00	-.01	.02	-.03	-.01	.39	.12

Number of Observations = 219,558 => standard error ≈ .002.

Endnotes

[1] We treat "common currencies", "currency unions", "monetary unions" and so forth synonymously.
[2] Walsh (2000) provides time series evidence on the dissolution of the Irish-British common currency.
[3] Gravity models have been much discussed in the literature; Rose (2000) provides references.
[4] There are a few instances where only FOB imports are available; we then use them instead of CIF imports.
[5] Since both exports and imports are measured by both countries, there are potentially four measured bilateral trade flows: exports from a to b, exports from b to a, imports into a from b, and imports into b from a.
[6] The IFS-based series are calculated by converting national currency GDP figures into dollars at the current dollar exchange rate, and then dividing by the US GDP deflator.
[7] The website is: http://www.odci.gov/cia/publications/factbook.
[8] Since we are not primarily interested in estimating the FTA effect, we treat all FTAs as being equal.
[9] These include Andorra-Spain/France; Belgium-Luxembourg; Austria-Liechtenstein; France-Morocco; Italy-Vatican; and South Africa-Lesotho/Swaziland/Namibia.
[10] These regime switches almost always occur before 1970, so that a time series technique was essentially not feasible for Rose's UN data set.
[11] We have also used different measures of exchange rate stability (e.g., not requiring that the exchange rate between the countries be 1:1 so long as it is extremely stable) without altering our conclusion that extreme monetary stability encourages trade.
[12] We have also examined the symmetry of entries into and exits from currency unions, but are stymied by the paucity of observations on currency union entries (which are outnumbered by exits by a ratio of over 8:1). When we do separate exits from entries, we find that the exit effect on trade is bigger than the entry effect, though our fixed effects and OLS estimates (but not the random effects estimate) do not reject equality of entry and exit coefficients at the .05 significance level. Nevertheless, it should be noted that exits tended to take place early in the sample while entries occurred late, so the effects of lags (as well as the number of data points) might bias the effect of entry downwards compared to the effect of entries. It would be interesting to pursue this issue using a methodology that accounts for the "interrupted spell" nature of the data, as well as the issues of (possibly non-randomly) missing data and repeated entries/exits from currency unions.
[13] Also, a random effects estimator corrected for AR(1) disturbances delivers an estimate of γ=.73 with a standard error of .08.