Independent Currency Unions, Growth, and Inflation

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During the last few years, there has been a renewed interest in currency unions. This is the result both of the recent wave of currency crises as well as the implementation of the euro. In this paper, the authors use panel data for 1970–98 to investigate economic performance under historical independent currency unions (ICUs) along three dimensions: GDP per capital growth, growth volatility, and inflation. They use a treatment effects model that estimates jointly the probability of having a common currency and its effect on performance. The authors find that ICU countries have had a significantly lower rate of inflation, but macroeconomic volatility has been higher. Also, ICU countries have grown faster than with-currency nations, but the East Caribbean Currency Area countries are found to be the driving force behind this result.

Key words: Currency unions; Dollarization; Inflation; GDP growth; GDP volatility; Treatment effects

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I. Introduction

During the last few years, interest in currency unions has truly exploded. Consider the following fact: according to the Social Science Citation Index, Mundell's classical 1961 article on optimal currency areas was cited 88 times in the period 1997–2002 (up to May); in contrast, during the five years from 1982 to 1987 it was only cited 17 times. This renewed interest in currency unions has been largely the result of two factors. First, the currency crises of the 1990s prompted a number of authors to argue that the emerging markets should give up their domestic currencies and join currency unions. Second, after the implementation of the euro zone in 1999, many analysts have argued that other nations should follow suit and join a monetary union. Others, however, have claimed that it is much too soon to evaluate the euro experiment, and that countries in other regions should wait for hard evidence on economic performance under the euro before joining a currency union. Still other experts have argued that the calibration of theoretical models can shed light on the question of whether specific countries should join a currency union (Alesina and Barro [2001]).

Currency unions, however, have been around for quite some time, and it is possible to use historical data to analyze economic performance in member countries. The purpose of this paper is to use panel data for 1970–98 to investigate economic performance under historical independent currency unions. In this analysis, we concentrate on countries that use a currency common to the union and issued by the union's central bank. We refer to this type of monetary arrangement as an "independent currency union," or ICU. In our analysis, thus, we do not focus on the case of "dollarized" countries, or countries that adopt an *advanced nation's* convertible currency as legal tender. There are important political and economic differences between that type of arrangement and dollarization: under an ICU, monetary policy is run by a common central bank, the members of the currency union share seigniorage, and the common currency's exchange rate may float relative to other currencies. Under "dollarization," on the other hand, the country in question completely gives up monetary independence, and monetary policy is run by the advanced nation's central bank. Countries can "dollarize" in a unilateral fashion—in which case they will lose the revenue from seigniorage—or they can sign a monetary treaty with the advanced country and share seigniorage.[1] Also, there are important political economy differences between dollarized and ICU countries. As Frieden (2001) has argued, adopting an advanced country's currency is usually perceived as giving up sovereignty, and has serious political costs. These political costs may be reduced, however, if the country becomes a partner in an ICU and, consequently, has a say in the running of monetary policy. It is even possible that, by joining an ICU, the country reaps most of the benefits of a common currency,

1. In early 2000, Florida's senior Senator at the time, Connie Mack, introduced legislation into the U.S. Senate aimed at sharing seigniorage with countries that decided to adopt the dollar as legal tender. The bill, however, did not move in the legislative process.

without incurring the costs associated with this measure.[2] Although as mentioned, our analysis deals mostly with ICUs, we do discuss briefly, in Section IV, some results pertaining to strictly dollarized countries.

To be more specific, in this paper we ask the following important question: how have the ICU countries performed relative to countries that have their own currency? That is, we are interested in evaluating economic performance along three dimensions: inflation, GDP per capita growth, and growth volatility. Performing this type of international comparison, however, is not easy. The problem is how to define an appropriate "control" group with which to compare the ICU nations. Since membership in an ICU is not a "natural experiment," using a broad control group of all countries with a domestic currency is likely to result in biased estimates. In this paper, we tackle this issue by using a *treatment effects model* that estimates jointly the probability of having a common currency and its effect on performance (Maddala [1983], Heckman *et al.* [1997], and Green [2000]).

Before proceeding, it is useful to point out the ways in which our analysis differs from other related work in this general area. First, we have sought to include data on as many ICU countries as possible. We were able to obtain data on GDP per capita growth and inflation for 34 ICU countries. Second, we focus directly on the most important macroeconomic variables—real GDP per capita growth, inflation, and growth volatility. Other studies, in contrast, have analyzed performance in an indirect fashion, and have focused on ancillary variables such as the level of international trade and/or interest rates. For instance, Frankel and Rose (2002) have analyzed the way in which currency unions affect bilateral trade and, through this channel, economic growth.[3] Edwards (1998), and Powell and Sturzenegger (2000) have investigated the way in which the exchange rate/monetary regime affects interest rate behavior, and the cost of capital. Third, we are particularly interested in estimating as precisely as possible the actual magnitude of the "ICU effect." That is, we want to know, in the most accurate possible way, by how many percentage points countries under a certain regime have outperformed (or underperformed) countries with an alternative regime. Obtaining precise estimates of the "ICU effect" is important for any cost-benefit analysis of a common currency regime. And fourth, we use a "treatment effects model" to estimate the way in which dollarization affects the macroeconomic variables of interest.

The rest of the paper is organized as follows. In Section II, we provide a preliminary analysis of historical experience with ICUs. In Section III, we use treatment regressions to analyze the effects of "common currencies" on a group of macroeconomic variables. In Section IV, we undertake a robustness analysis and, finally, in Section V we provide some concluding remarks.

2. In our analysis, we consider countries that adopt a nonconvertible currency as their own as an ICU. If these few countries are excluded from the analysis, the results reported in this paper do not change, however.

3. See Klein (2002) for a discussion on dollarization and trade, including a comprehensive bibliography on the subject.

II. Independent Currency Unions during 1970–98: A Preliminary Analysis

In Table 1, we present a list of 33 ICU countries with available data for the period 1970–98.[4] In addition, we present a list of 21 strictly dollarized countries, or countries that have used an advanced country's currency as legal tender. Two ICUs dominate the list in Table 1: the Communauté Financière Africaine (CFA) franc zone, and the East Caribbean Currency Area (ECCA), with 15 and seven members, respectively. Both of these ICUs have a central bank of their own, and in an effort to boost credibility, both of these areas have pegged their exchange rates to an advanced nation. The CFA franc zone is pegged to the French franc, and has an agreement with France to finance balance of payments disequilibria. In 1994, and after years of overvaluation and external imbalances, the CFA was devalued and repegged to the French franc. Until 1975, the ECCA's East Caribbean dollar was pegged to the British pound; since that year, it has been pegged to the U.S. dollar.

Table 1 Monetary Unions with Available Data

CFA Franc Zone	**France**	**Italy**
Benin	Andorra (also Spanish peseta) (D)	San Marino (D)
Burkina Faso	French Guiana (D)	
Cameroon	French Polynesia	**Australia**
Central African Republic	Guadeloupe (D)	Kiribati (D)
Chad	Martinique (D)	Nauru (D)
Comoros	Monaco (D)	Tonga (D)
Congo	New Caledonia	Tuvalu (D)
Côte d'Ivoire	Reunion (D)	
Equatorial Guinea		**West Africa**
Gabon	**ECCA**	Kenya
Guinea-Bissau	Antigua and Barbuda	Tanzania
Mali	Dominica	Uganda
Niger	Grenada	
Senegal	Montserrat	**India**
Togo	St. Kitts and Nevis	Bhutan
	St. Lucia	
United States	St. Vincent and the Grenadines	**Singapore**
Liberia (D)		Brunei
Marshall Islands (D)	**South Africa**	
Micronesia, Fed. States of (D)	Lesotho	**Denmark**
Palau (D)	Namibia	Greenland (D)
Panama (D)	Swaziland	
Puerto Rico (D)		**Switzerland**
	New Zealand	Liechtenstein (D)
	Cook Islands (D)	
		Belgium
		Luxembourg (D)

Note: (D) corresponds to a dollarized country.

4. These countries have data for a long enough period for at least one of two variables: GDP per capita or inflation. In the rest of the paper, we will use the term "countries" to refer both to independent countries and to territories.

In Table 2, we present comparative data on inflation, per capita GDP growth, and the standard deviation of growth for our ICU countries. To put things in perspective, we also present data on these three variables for an "unadjusted" control group that includes all countries with a currency of their own. In this table, we include data on the mean and median for the three macroeconomic variables. In column (C), we present data on mean and median differences between the common currency countries and the "with currency" control group. The numbers in parentheses are *t*-statistics for the significance of these differences. The test for the mean differences is a standard *t*-statistic, while the median *differences* test is a *t*-test obtained using a bootstrapping procedure. In making the computations for inflation differentials, we have followed Engel and Rose (2002) and have excluded countries with hyperinflation.[5] However, excluding these observations only affects the calculation of the mean differences; it has no discernible effect on the computation of median differences.

The results reported in this table indicate that the difference in inflation means is quite sizable and statistically significant; on average, inflation in ICU countries as a group (Panel A) has been 7.7 percentage points *lower* than in countries with their own currency.[6] The difference in inflation medians is still negative, much smaller (–2 percentage points), and still statistically significant. In terms of real per capita GDP growth, the results in Table 2 show that there are no significant differences in

Table 2 Inflation, Growth, and Volatility

	ICUs versus control group		
	Independent currency unions[1] (A)	Other countries[2] (B)	Difference[3] (C) = (A) – (B)
A. Inflation			
Mean	8.90	16.59	–7.69 (–7.07)
Median	7.22	9.46	–2.24 (–4.86)
B. Per capita GDP growth			
Mean	1.36	1.16	0.20 (0.76)
Median	1.30	1.88	–0.58 (–3.88)
C. Volatility of growth			
Mean	6.23	5.31	0.92 (7.80)
Median	5.31	4.58	0.73 (7.20)

Notes: 1. Number of observations with data for inflation is 533. There are 804 observations with data for per capita growth.
2. Number of observations with data on inflation is 2,831. There are 3,933 observations with data for per capita GDP growth.
3. Numbers in parentheses are *t*-statistics.

5. More specifically, we excluded from the control group those observations with a rate of inflation in excess of 200 percent per year. This resulted in 80 observations being dropped from the control group of countries with a currency of their own. See Section IV for results under alternative definitions of "very rapid inflation."
6. When hyperinflation countries are not excluded, the means difference in inflation is a staggering 62 percent.

the *means* across the ICU countries and the control group. The results also indicate, however, that the median differences are significantly negative: the median rate of growth in the ICUs has been significantly lower—in a statistical sense—than in the control group of countries with a currency of their own. Finally, our results show that the ICUs have experienced greater growth volatility than the control group.

Although the comparisons reported in Table 2 are informative, they are subject to two potential limitations. First, these are unconditional comparisons, as no effort has been made to control for other factors potentially affecting macroeconomic performance. Second, the control group may not be the appropriate one. If this is the case, the results presented in Table 2 may be subject to a "treatment bias."[7]

III. A Treatment Effects Model of Economic Performance in the ICUs

Much of the recent enthusiasm for "dollarization" and common currencies has been based on the idea that emerging countries with a currency of their own lack credibility, and are subject to a Barro-Gordon type of "inflationary bias." It has been argued that by adopting an advanced country's currency, credibility will be established and inflation will be lower than otherwise. It is difficult, however, to make the point that an ICU central bank will be more credible than a national one. It is precisely for this reason that many of the ICUs in Table 1 have attempted to deal with this credibility problem by pegging the union's currency to that of an advanced nation. Whether they, indeed, succeed in doing this and reaching a low-inflation equilibrium is an empirical question, and one that we address in detail in the rest of this paper.

In principle, the decision to have a "common currency" could affect the growth process through at least two potential channels. First, if exchange rate risk is very low, as ICU supporters have argued, the union members will face a low(er) cost of capital. This, in turn, will result in a higher rate of physical capital accumulation and a higher rate of growth of *potential output*. Second, a higher level of international trade—which, as Rose (2000) has argued, is associated with common currencies—is likely to have a positive effect on total factor productivity (TFP) growth, and on real GDP growth. This effect has been emphasized in a number of endogenous growth models, and operates through the effect of openness on the accumulation of knowledge. In the final analysis, this is also an empirical issue; we deal with it in the rest of this paper.

Membership in an ICU is also likely to affect the volatility of growth. Indeed, hard-peg exchange rate regimes will tend to limit a country's ability to accommodate external terms of trade shocks. Thus, ICU countries are likely to have a higher degree of growth volatility than countries with a currency of their own and, in particular, than countries with exchange rate flexibility.[8] In this section, we use a treatment effects model to address this issue.

7. See Maddala (1983).
8. On external shocks and exchange rate regimes, see Meade (1951) and Corden (2000).

A. The Model

Our objective is to undertake a comparative analysis of the effect of an ICU exchange rate regime on macroeconomic performance. We are particularly interested on the comparative performance of GDP per capita growth, inflation, and growth volatility. We use an unbalanced data set for 199 countries during 1970–98. Our empirical treatment effects model is given by

$$y_{jt} = \boldsymbol{x_{jt}}\beta + \gamma\delta_j + \mu_{jt}. \tag{1}$$

$$\delta_{jt} = \begin{cases} 1, \text{ if } \delta^*_{jt} > 0 \\ 0, \text{ otherwise} \end{cases} \tag{2}$$

$$\delta^*_{jt} = \boldsymbol{w_{jt}}\alpha + \varepsilon_{jt}. \tag{3}$$

Equation (1) is the macroeconomic performance equation, where y_{jt} stands for each of the macroeconomic variables of interest in country j and period t; $\boldsymbol{x_{jt}}$ is a vector of covariates that captures the role of traditional determinants of economic performance; and δ_{jt} is a dummy variable (i.e., the treatment variable) that takes a value of one if country j in period t is an ICU country, and zero if the country has a currency of its own. μ_{jt} is an error term, whose properties are discussed below. β and γ are parameters to be estimated. The decision to be an ICU country is assumed to be the result of an unobserved latent variable δ^*_{jt}, as described in equation (2). δ^*_{jt}, in turn, is assumed to depend linearly on vector $\boldsymbol{w_{jt}}$. Some (or all) of the variables in $\boldsymbol{w_{jt}}$ may be included in $\boldsymbol{x_{jt}}$ (Maddala [1983, p. 120]).[9] α is a parameter vector to be estimated, and ε_{jt} is an error term. Error terms μ_{jt} and ε_{jt} are assumed to be bivariate normal, with a zero mean and a covariance matrix given by

$$\begin{bmatrix} \sigma & \varsigma \\ \varsigma & 1 \end{bmatrix}. \tag{4}$$

If the performance and common currency equations are independent, the covariance term ς in equation (4) will be zero. Under most plausible conditions, however, it is likely that this covariance term will differ from zero.

Green (2000, p. 934) has shown that if equation (1) is estimated by least squares, the treatment effect will be overestimated. Traditionally, this problem has been tackled by estimating the model using a two-step procedure (Maddala [1983]). In the first step, the treatment equation (2) is estimated using probit regressions. From this estimation, a hazard is obtained for each j,t observation. In the second step, the outcome equation (1) is estimated with the hazard added as an additional covariate. From the residuals of this augmented outcome regression, it is possible to compute consistent estimates of the variance-covariance matrix (4). An alternative and in principle more efficient way of dealing with the model in equations (1) through (4)

9. It is assumed, however, that δ^*_{jt} does not depend on y_{jt}. Otherwise, as discussed below, the model cannot be identified.

is to estimate them jointly using a maximum likelihood procedure. The results reported in this paper have been obtained using this maximum likelihood procedure. As shown by Green (2000), the log likelihood for observation k is given by equations (5) and (5′):

$$L_k = \log \Phi \left\{ \frac{w_k \alpha + (y_k - x_k \beta - \delta) \varsigma / \sigma}{\sqrt{1 - \varsigma^2}} \right\} - \frac{1}{2} \left\{ \frac{y_k - x_k \beta - \delta}{\sigma} \right\}^2 - \log \sqrt{2\pi}\sigma, \quad \text{if } \delta_k = 1. \tag{5}$$

$$L_k = \log \Phi \left\{ \frac{-w_k \alpha - (y_k - x_k \beta) \varsigma / \sigma}{\sqrt{1 - \varsigma^2}} \right\} - \frac{1}{2} \left\{ \frac{y_k - x_k \beta}{\sigma} \right\}^2 - \log \sqrt{2\pi}\sigma, \quad \text{if } \delta_k = 0. \tag{5′}$$

The model in equations (1) through (4) satisfies the consistency and identifying conditions of mixed models with latent variables if the outcome variable y_{jt} is not a determinant (directly or indirectly) of the treatment equation—that is, if y is not one of the variables in w in equation (3).[10] This seems to us to be a reasonable assumption. See Maddala (1983) and Angrist (2000) for further discussion of these issues.

B. Basic Results

In this subsection, we report the results obtained from the estimation of the treatment effects model given by equations (1) through (4). The "treatment group" is defined as all countries that belong to an ICU. That is, the dummy variable δ_{jt} takes a value of one if in period t country j is an ICU member. The data set is an unbalanced panel that covers 1970 through 1998, and includes 199 countries and territories. The number of observations varies, depending on the performance variable considered; see Table 2 for details.

1. The probability of being an ICU country

The following exogenous covariates were included in the estimation of the treatment equation (3) on the probability of being an ICU country:

(a) The log of population measured in millions of people, as an index of the country's size.
(b) The log of initial (1970) GDP, taken as a measure of the country's economic size.

10. Details on identification and consistency of models with mixed structures can be found in Maddala (1983). See also Angrist (2000).

(c) An indicator of the degree of openness of the economy. For the majority of countries and years, we used the Sachs and Werner's (1995) openness index, which takes a value of one if the country in question is open to international trade, and zero otherwise. We used data from a variety of sources to supplement the Sachs-Werner index for those countries and years not covered in their sample.[11]
(d) A dummy variable that takes the value of one if the country in question is an island.
(e) A dummy variable that takes the value of one if the country has a common border with a nation whose currency is defined by the International Monetary Fund (IMF) as a "convertible currency."
(f) A variable that measures the country's geographical location, or proximity to global markets. We call this variable "latitude."
(g) Latitude square.
(h) A dummy variable that takes the value of one if the economy in question is an independent nation.

2. The outcome equations

Some of the traditional covariates in the outcome equations (1) for GDP growth, inflation, and volatility are unavailable for the smaller countries. For instance, few of the ICUs have data on education quality or on some other variables traditionally included in growth empirical analyses (Barro [1996]). Indeed, popular data sets, such as the World Bank's *World Development Indicators* (WDI), the IMF's *International Financial Statistics* (IFS), or the Barro and Lee (1996) data set, do not include data on all the ICU countries. Nevertheless, we have been able to include a number of covariates. In the estimation of the GDP growth equation, we included, as customary, initial GDP, a measure of openness, a dummy for independence, a measure for geographical proximity (latitude), and the ICU dummy. In some specifications, we also introduced lagged (and lagged square) terms of the dependent variable, as well as regional dummies. In the inflation-common currencies model, we included openness, the independence dummy, lagged inflation (as a measure of persistence), regional dummies, and the common currency dummy as covariates in the outcome equation. Finally, in the volatility-common currency model, we included the following covariates in the outcome equation: openness; geographical location, measured by latitude; regional dummies; and log of population and log of GDP in 1970, as a measure of the initial level of development of the country.

3. Results

In Table 3, we summarize the results obtained from the estimation of the treatment effects model for GDP per capita growth. Table 4 contains the results for inflation, and Table 5 those for growth volatility. Each of these tables contains two panels. The upper panel includes the results from the outcome equation; the lower panel contains the estimates for the "treatment equation."

We first discuss the results from the treatment equations on the probability of being an ICU country: as may be seen from these tables, the results are quite similar

11. See the original Sachs and Werner (1995) article for a specific list of requirements for a country to qualify as "open."

Table 3 Growth and Independent Currency Unions: A Treatment Effects Model

	Model 1	Model 2	Model 3
Outcome equation			
Log(GDP_0)	–0.45 (–5.94)	–0.54 (–6.20)	–0.51 (–6.01)
OPEN	3.33 (11.02)	3.22 (10.55)	3.15 (10.43)
LATITUDE	7.94 (4.15)	4.84 (2.36)	—
$LATITUDE^2$	–10.32 (–3.71)	–4.12 (–1.33)	—
DUMMY_ICU	1.33 (2.70)	1.60 (3.20)	1.19 (2.43)
Constant	2.48 (4.64)	4.18 (6.06)	4.88 (7.85)
EUROPA	—	–1.35 (–3.01)	–0.84 (–2.45)
LAC	—	–0.02 (–0.07)	–0.08 (–0.26)
MENA	—	–0.84 (–2.12)	–0.59 (–1.53)
NORAM	—	–0.62 (–0.78)	–0.18 (–0.24)
SASIA	—	0.45 (0.89)	0.54 (1.06)
AFRICA	—	–2.00 (–6.06)	–2.21 (–6.87)
Treatment equation			
Log(POP)	–0.31 (–15.25)	–0.31 (–15.22)	–0.31 (–15.13)
Log(GDP_0)	–0.05 (–2.55)	–0.05 (–2.55)	–0.05 (–2.54)
INDEP	–1.02 (–8.99)	–1.03 (–9.00)	–1.03 (–9.02)
BORDER	–0.93 (–6.03)	–0.93 (–6.04)	–0.93 (–6.01)
OPEN	–3.97 (–8.62)	–3.98 (–8.63)	–4.01 (–8.66)
ISLAND	–0.69 (–7.90)	–0.70 (–8.01)	–0.70 (–8.06)
LATITUDE	2.21 (2.50)	2.20 (2.49)	2.21 (2.49)
$LATITUDE^2$	–14.63 (–6.30)	–14.66 (–6.29)	–14.75 (–6.29)
Constant	5.79 (15.17)	5.78 (15.16)	5.77 (15.10)
Number of observations	4,888	4,888	4,888
LR χ^2	0.65	0.11	0.33
Prob > χ^2	0.420	0.744	0.564

Note: Numbers in parentheses are *t*-statistics.

Table 4 Inflation and Independent Currency Unions: A Treatment Effects Model

	Model 4	Model 5	Model 6
Outcome equation			
OPEN	–12.60 (–10.87)	–4.76 (–4.64)	–5.90 (–6.19)
LATITUDE	–4.53 –1.75	–3.20 (–1.01)	–7.63 (–3.64)
INFL1L	—	0.34 (38.11)	0.35 (39.17)
INFL1L^2	—	–0.00 (–31.89)	–0.00 (–32.65)
DUMMY_ICU	–17.42 (–9.95)	–14.08 (–9.33)	–10.45 (–6.77)
Constant	23.36 (26.37)	9.16 (7.66)	14.83 (19.39)
EUROPA	—	3.24 (2.07)	—
LAC	—	7.58 (6.51)	—
MENA	—	0.99 (0.70)	—
NORAM	—	0.93 (0.33)	—
SASIA	—	1.17 (0.70)	—
AFRICA	—	8.86 (7.25)	—
Treatment equation			
Log(POP)	–0.45 (–15.72)	–0.45 (–15.63)	–0.45 (–15.61)
Log(GDP$_0$)	–0.15 (–4.32)	–0.16 (–4.57)	–0.16 (–4.59)
INDEP	–0.44 (–2.11)	–0.46 (–2.23)	–0.47 (–2.28)
BORDER	—	—	—
OPEN	–5.26 (–7.57)	–5.09 (–7.36)	–5.16 (–7.47)
ISLAND	–1.41 (–11.18)	–1.44 (–11.53)	–1.43 (–11.35)
LATITUDE	0.81 (0.69)	0.59 (0.49)	0.47 (0.40)
LATITUDE^2	–10.45 (–3.31)	–10.08 (–3.15)	–9.60 (–3.08)
Constant	8.22 (14.11)	8.32 (14.18)	8.33 (14.19)
Number of observations	2,956	2,956	2,956
LR χ^2	10.95	9.31	5.35
Prob > χ^2	0.000	0.002	0.020

Note: Numbers in parentheses are *t*-statistics.

Table 5 Volatility and Independent Currency Unions: A Treatment Effects Model

	Model 7	Model 8
Outcome equation		
OPEN	–3.21 (–4.40)	–3.02 (–4.38)
LATITUDE	2.32 (1.42)	–0.22 (–0.10)
LGINI	0.37 (1.94)	0.26 (1.29)
DUMMY_ICU	3.46 (4.06)	3.15 (3.48)
Constant	2.29 (1.84)	3.53 (2.34)
EUROPA	—	1.20 (1.19)
LAC	—	–0.84 (–1.14)
MENA	—	2.38 (2.62)
NORAM	—	–1.60 (–0.87)
SASIA	—	–1.30 (–1.14)
AFRICA	—	–0.007 (–0.01)
Treatment equation		
Log(POP)	–0.33 (–3.43)	–0.38 (–3.58)
Log(GDP_0)	–0.06 (–0.58)	–0.08 (–0.87)
INDEP	–1.53 (–1.43)	–1.96 (–1.46)
BORDER	–0.11 (–0.13)	–0.38 (–0.37)
OPEN	–4.44 (–1.73)	–4.06 (–1.57)
ISLAND	–1.31 (–3.32)	–1.23 (–2.82)
LATITUDE	–0.96 (–0.32)	–0.49 (–0.14)
$LATITUDE^2$	–6.21 (–0.87)	–7.29 (–0.87)
Constant	7.06 (3.15)	8.28 (3.32)
Number of observations	174	174
LR χ^2	5.37	3.44
Prob > χ^2	0.020	0.063

Note: Numbers in parentheses are *t*-statistics.

across models and are quite satisfactory. They clearly indicate that the probability of being an ICU country is higher for small countries, in terms both of population (POP) and initial GDP per capita (GDP_0). Being an independent nation (INDEP) reduces the probability of being an ICU. Proximity to international markets (LATITUDE) reduces the probability of belonging to an ICU; the coefficients of the island (ISLAND) and border (BORDER) variables are significantly negative. Perhaps the most interesting aspect of these results is that the open variable (OPEN) has a significantly negative coefficient, suggesting that with other things given countries that are more open to international trade are less likely to belong to an ICU. This result contrasts with the case of strictly dollarized nations, where the openness coefficient is significantly positive (Edwards and Magendzo [2001]).

4. GDP per capita growth

In Table 3, we present the results obtained from the estimation of the growth model when maximum likelihood estimation techniques were used. Results obtained using two-step procedures yielded very similar outcomes, and are available to interested readers on request. These results show that for all specifications the coefficient of the ICU dummy is positive, with a point estimate ranging from 1.19 to 1.60. This suggests that, with other things given, ICU countries have grown at a faster rate than countries with a currency of their own. Notice that these results are quite different from the simple mean differences reported in Table 2: while according to those results there have been no differences in rates of growth across the two groups of countries, the estimates in Table 3 indicate ICU members have grown at a significantly faster rate than countries with a currency of their own.

The coefficient of most of the other covariates in the growth equations have the expected signs, are statistically significant, and have signs that conform with what was expected. The geographical dummies are quite interesting and establish that the Middle East and Africa are particularly slow-growing regions. An additional aspect of the results in Table 3 is worth mentioning: the χ^2 test for the independence of the treatment and outcome equations indicates that in all but one of the specifications the null hypothesis of independence across the equations is rejected at conventional levels.

5. Inflation

The results for the inflation model are reported in Table 4. As may be seen from the outcome equation in the upper panel, the ICU dummy is negative and significant in every one of the specifications. The point estimates range from –17 to –10, not only confirming that inflation has historically been lower in the ICU countries, but also indicating that the ICU advantage is still detected after a treatment effects model is used. It is interesting to note that relative to the benchmark (Asia), Latin America and Africa have had a significantly higher rate of inflation. The null hypothesis of independent equations is rejected at conventional levels.

6. Volatility

Table 5 contains the results for the volatility models, estimated using a cross-section of countries. The null hypothesis of independent equations is rejected at conventional levels—the χ^2 statistics range from 3.4 to 5.4—and the dummy variables for ICU are significantly positive, indicating that countries that belong to a currency union have experienced a higher degree of growth volatility than countries with a currency of their own. Openness reduces volatility—a result that is in line with a number of theoretical results in international economics. Our estimates indicate that countries with a higher level of development (measured by initial GDP) exhibit higher volatility. Also, with other factors given, the countries of the Middle East and North Africa (MENA) have exhibited a higher degree of volatility than countries in other regions. In what appears to be a counterintuitive result, the coefficient for the Europe dummy is positive, although not significant. The reason for this apparent anomaly is that the Eastern European nations and some of the former Soviet Union republics are part of the World Bank European region. Finally, we note that the estimated coefficients for the ICU dummy are significantly larger than the mean differences in volatility presented in Table 2.

IV. Further Results and Robustness Analysis

In this section, we deal with some extensions, investigate the robustness of the results, and inquire as to what is behind the results reported above.

A. Redefining "Very Rapid Inflation"

In our inflationary analysis, we excluded countries with *extremely rapid inflation*, or "hyperinflation countries." In the estimates reported in Tables 3 through 5, the sample excluded countries with a rate of inflation in excess of 200 percent per year.[12] It is possible, however, that by still allowing highly inflationary countries in the sample, the estimates obtained are being driven by extreme or outlier observations. To investigate this issue, we re-estimated the inflationary equation under alternative definitions of "very rapid inflation." More specifically, in the alternative estimates we first excluded observations with an annual rate of inflation in excess of 100 percent; we then repeated the exercise, excluding observations with inflation in excess of 50 percent per year.

The results obtained when these new samples were used confirmed those reported above, in the sense that inflation is significantly lower in ICU countries. Interestingly, however, under these new definitions of very rapid inflation the ICU advantage appears to be greater. When inflation above 100 percent was excluded, the estimated treatment coefficient was –14.7 for ICUs; when inflation above 50 percent was excluded, the estimated treatment coefficient was –10.0.

B. Non-Parametric Methods

It is possible that the specification forms chosen for the outcome equations affect the results reported above. In particular, the linearity of most of the equations may affect the estimates of the "treatment coefficient." To investigate whether this is an important factor, we undertook a non-parametric analysis based on "matching estimators" (see Blundell and Costa Dias [2000]). This approach consists of using the available data to reestablish the conditions of a natural experiment. A general advantage of this

12. Engel and Rose (2002) also excluded hyperinflation observations.

nonparametric method is that no particular specification of the underlying model has to be assumed.[13] Matching estimators use the existing data to construct an appropriate sample counterpart for the missing information. This is done by pairing each ICU country with countries from the with-domestic-currency group. If the sample is large enough, for each treated (ICU) observation we can find, in principle, at least one untreated observation with exactly the same characteristics. Each of these properly selected untreated observations provides the required counterfactual for our comparative analysis.[14] The problem is that under most general conditions it is not possible to find an *exact* match between a treated and untreated observation. The matching estimator method focuses on estimating an average version of the parameter of interest.[15] That is, the matching estimator consists of obtaining the difference in outcome as an average of the differences with respect to "similar"—rather than identical—untreated outcomes. Rosenbaum and Rubin (1983) have shown that an efficient and simple way to perform this comparison is to rely on a *propensity score*, defined as the probability of participation or treatment: $P(x) = Prob(D = 1/x)$. In our case, this is the probability of a country being a common currency country. This reduces a multi-dimensional problem to a one-dimensional problem, provided that we can estimate $P(x)$. Instead of matching countries directly on all of their characteristics, we can compare countries with similar probability of being a common currency country.

We use two alternative methods for computing matching estimators. First, we use a *simple-average nearest neighbor* estimator. According to this method, for each treated observation, we select a predetermined number of untreated nearest neighbor(s). The nearest neighbors of a particular treated observation i are defined as those untreated observations that have the smallest difference in propensity score with respect to i. We applied the above method to both one nearest neighbor and five nearest neighbors. The second method consists of using *local linear regressions* to identify each matching observation (Fan [1993]). The results obtained from these two matching estimators, not reported in detail here due to space considerations, provided ample support for the findings presented in Tables 3 through 5 of this paper. The matching results are available to interested readers; see also Edwards and Magendzo (2001).

13. If we estimate the equation above using all non-treated observations, the selection bias is given by

$$B(x) = E(u_0/x, D = 1) - E(u_0/x, D = 0).$$

14. To guarantee that all treated agents have such a counterpart in the population (not necessarily in the sample), we also need to assume that $0 < Prob(D = 1/x) < 1$.

15. This averaged version is given by

$$M(S) = \frac{\int_S E(y_1 - y_0/x, D = 1)dF(x/D = 1)}{\int_S dF(x/D = 1)},$$

where S is a subset of the support of x given $D = 1$.

C. A Comparison With "Strictly Dollarized" Countries

An interesting question is how the performance of ICU countries compares with other types of hard-peg regimes. More specifically, how does it compare with the performance of countries that have a strictly dollarized monetary system? We have dealt with the case of "strict dollarization" in some of our previous work (see, for example, Edwards and Magendzo [2001]). The results from a formal comparison—which also relies on a treatment effects model—between ICU and "strictly dollarized" countries may be summarized as follows:

- In the GDP growth models, the dummy for "strict dollarization" is not significant. In one of the specifications, the point estimate is even negative. This contrasts with the results for ICUs reported in this paper, where the treatment dummy is significantly positive.
- In the inflation models, the dummies for both the "strictly dollarized" and the "ICU" countries are significantly negative, confirming that both types of common currency countries have been able to have a significantly lower rate of inflation than the with-domestic-currency countries.
- In the inflation models, the *point estimates* for the dummies are quite different for the two groups of countries. The two specifications that do not include the regional dummies suggest that the "low-inflation" advantage is greater for the "strictly dollarized" countries, indicating that both super hard-peg regimes have resulted in higher real volatility than with-domestic-currency regimes.
- The results for the volatility model show that the dummies' coefficients are significantly positive for both groups of countries. Although the point estimates are larger for the ICU countries, they are not significantly so.

D. What Is Really Behind These Results? Comparing the CFA and the ECCA

From a policy perspective—and in particular, from a "lessons" point of view—an interesting question is whether a specific group of countries is behind the results reported in the preceding sections. We are particularly interested in understanding whether there is any pattern behind the results suggesting that ICU countries grow significantly faster than countries with a currency of their own. To investigate this issue, we analyzed the residuals from our regression analysis and inquired as to the characteristics of our ICU data set.

A detailed inspection of the residuals as well as the raw data suggests that there are very substantial differences in economic growth between the ECCA nations, on the one hand, and the rest of the ICU countries. Indeed, for the period under consideration average yearly GDP per capita growth in the ECCA countries has been 3.16 percent. In the other ICU countries, on the other hand, it has only been 0.79 percent. The comparison of medians yields a similar result, with the median growth for ECCA countries at 3.60 percent, and that for the rest of the ICUs at 0.72 percent.[16] This unconditional comparison suggests that the ECCA nations' performance is behind our findings that, with other things given, ICU nations grow at a faster rate than countries with a domestic currency. To investigate this, we

16. During this period, growth in the CFA nations was particularly low.

estimated separate treatment GDP growth model effects for ECCA and other-ICU nations.[17] The estimated coefficient for the ECCA common currency dummy variable was 2.3, with a *t*-statistic of 4.46, confirming that ECCA nations have outperformed by a wide margin countries with a currency of their own. The results for the non-ECCA ICU countries were quite different, with a statistically insignificant estimated coefficient for the treatment dummy of 0.5.[18] These results, then, confirm the notion that the driving force behind the apparent superior growth performance of common currency countries, reported in Table 3, is fully driven by the group of ECCA nations.

VI. Concluding Remarks

The purpose of this paper is to analyze, from a comparative perspective, economic performance in economies that belong to an ICU and countries that have a currency of their own. We have argued that the main difficulty in performing this type of comparison refers to defining the correct "control group" with which to compare the performance of the ICU members. In this paper, we have tackled this issue by using the "treatment effects model" developed in the labor economics literature. Estimation using this technique yields results that are rather different from those obtained from raw comparisons using a large control group of all with-domestic-currency countries. More specifically, we have found that both ICU countries have had a significantly lower rate of inflation than with-currency ones. We have found that macroeconomic volatility has been higher in ICU economies than in with-currency countries.

We believe that our results are particularly interesting with respect to GDP growth. The estimations reported in Table 3 suggest that ICU countries have grown faster than with-currency nations. In fact, results from an extended analysis indicate that ICU countries also grew at a faster pace than "strictly dollarized" nations. When we investigated these findings further, we found that the ECCA countries were the driving force behind this estimated superior growth performance of ICUs. Indeed, once these seven countries were excluded from the sample, we found no statistical difference in GDP per capita growth in the rest of the ICU countries and countries with a currency of their own. The ECCA countries constitute, indeed, a very special group: they are very small, with an average population of less than 100,000 inhabitants. They are all islands, geographically close to major markets. Their main industry is tourism, and they have very close economic and cultural ties with the United Kingdom. However, we believe that their experience with an ICU may not be entirely useful for larger countries planning to reform their exchange rate and monetary regime.

17. In the estimation, we had to respecify the treatment equation. The reason is that some of the regressors (islands, for example) fully predicted the probability of being a currency union country.

18. These results are from a specification that includes regional dummies in the GDP growth outcome equation. If these dummies are excluded, the ICU dummy becomes negative with a *t*-statistic of –1.46.

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Comment

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This paper is an interesting empirical study of exchange rate regimes. It provides some insights on the advantages of forming a currency union and on which countries are able to benefit from this regime. I will first summarize the paper's main lessons about exchange rate regimes. I will then discuss some issues related to the empirical methodology and comment on the interpretation of the results.

I. Main Lessons about Exchange Rate Regimes

Three main lessons emerge from this paper. First, the empirical analysis suggests that only a limited number of economies are likely to opt for membership of a currency union. Based on past experience, the likely candidates are small countries that are geographically close to international financial centers. This is consistent with the broadly held view that small countries are more likely to benefit from a corner solution that implies irrevocably fixing the exchange rate. The authors also find that countries which *ceteris paribus* are independent and open to trade are less likely to be members of a currency union.

Second, there is evidence that countries which form a currency union tend to have better macroeconomic performance compared to other countries. Between 1970 and 1998, members of currency unions experienced both faster output growth and lower inflation. They also outperformed countries that had dollarized. The magnitude of these differences is both economically and statistically significant, even after controlling for a set of other factors that might have driven growth and inflation. The authors also find that currency union members exhibited higher growth volatility compared to other countries.

Third, the analysis of the paper implies that geography may play a key role in the performance of exchange rate regimes. The superiority of currency unions is mainly driven by one currency union in the sample, the East Caribbean Currency Area (ECCA).

II. Methodological Issues

In terms of the empirical methodology, Edwards and Magendzo improve on the existing literature in three respects. First, they argue that separately estimating the probability of a country joining a currency union and the influence of this decision on macroeconomic performance would generate a selection bias. This bias would

19. The opinions expressed in these comments are those of the author and do not necessarily reflect the views of the Bank for International Settlements.

make standard econometric tests unreliable. To avoid this problem, the authors jointly estimate both relationships using a treatment effects model borrowed from the labor economics literature. Second, the authors checked that their comparison between alternative exchange rate regimes is not affected by their definition of "very rapid inflation." Third, they carefully select a control group using two variants of a non-parametric method based on matching estimators. This method, which is again borrowed from empirical labor economics, should prevent the results from being contaminated by use of the wrong benchmarks for comparison. The authors report that using these techniques does not affect their main findings.

Edwards and Magendzo also carefully analyze their empirical results. They identify one currency union, the ECCA, as the driving force of the superior results for currency unions. Moreover, they mention that for some countries island effects were dominant.

While the authors should be commended for their careful treatment of a number of problems that have affected the empirical literature on the relative performance of different exchange rate regimes, some methodological issues still remain. First, the timing of the decision to adopt a currency union could affect the regression results. For example, if countries adopt a currency union following a crisis, per capita GDP is likely to grow faster after the decision to join. The paper may therefore benefit from an analysis of the conditions under which countries opted to join a currency union.

Second, exchange rate policies that were followed before and after the decision to form a currency union may matter. This is illustrated by the experience of countries that are part of the Gulf Cooperation Council (GCC) and have decided to form a Gulf Monetary Union in the near future. These countries have since the mid-1980s *de facto* (with the exception of Kuwait), and since December 2000 officially, pegged their currency to the dollar. This policy is likely to continue after the monetary union is formed. Given the modest volume of intra-regional trade, would the impact of fixing intra-GCC exchange rates dominate that of keeping the external value of the currency constant? Edwards and Magendzo's analysis puts more emphasis on the former.

Third, the authors may wish to investigate the timing of the impact of a decision to join a currency union on a country's macroeconomic performance. Their empirical model implies that this impact is immediate. The experience of the European Monetary Union (EMU) and Frankel and Rose's (1998) argument about the endogeneity of the optimum currency area criteria seem to suggest that the full impact may be reached only after some time.

I also have two comments on the specification of the determinants of the choice to adopt a currency union. First, while the authors use geographical proximity to financial centers as an explanatory factor, *a priori* financial depth appears to be the more relevant variable. Second, it would be interesting if the authors could address the role of the political will to seek closer economic and financial integration in the decision to form a monetary union. The importance of this factor for the EMU has recently been emphasized by Wyplosz (2001).

III. Interpretation of the Results

An important issue on interpretation relates to the applicability of the results to the EMU and Asia. Edwards and Magendzo start their paper by arguing that the advent of the EMU to a large extent explains the strong interest that currency unions have received in recent years. It is therefore natural to ask what the paper has to say about the EMU. Judging from the estimates of the treatment equation, the factors that explain the decision to enter a currency union do not apply to most of the countries that joined the EMU. Nor do they appear to predict countries that are candidates for the EMU's enlargement. These considerations raise the question of whether Edwards and Magendzo's paper tackled the selection bias, but their analysis may be affected by what is sometimes referred to as an "extrapolation bias."

Apart from the EMU, it is also interesting to look at what the paper predicts for Asian countries. In their paper presented at this conference, Fujiki and Otani (2002) discuss the desirability of different exchange rate regimes for Asia, including a common currency area. Edwards and Magendzo's empirical analysis seems to suggest that a currency union is unlikely to be formed in Asia. It would be interesting to have some explicit discussion of this point in the paper.

Another issue on interpretation that I would like to raise concerns the main finding that currency union members tended to outperform other countries in terms of inflation and output. Although in principle I can think of several explanations for this result, I have difficulty in understanding how they can matter. First, the decision to join a currency union could improve macroeconomic performance by boosting credibility, as the authors argue. However, given the results of the treatment equation, it is not entirely clear why countries would gain more credibility by joining a currency union rather than choosing dollarization.

Second, Rose (2000) and Glick and Rose (2002) have shown that the decision to join a currency union might improve output growth by increasing trade in goods and services. However, this channel is unlikely to play an important role for the countries that are likely to join a currency union according to the paper, given their small size.

The recent experience of the EMU suggests that a third explanation could involve the impact of forming a currency union on financial markets, which in turn may have significant benefits for the macroeconomic performance of member countries.[20] Again, the description of currency unions included in the data set of the paper seems to indicate that this factor does not explain the superior performance of currency unions.

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20. See, e.g., Danthine *et al.* (2000), Detken and Hartmann (2000), and Galati and Tsatsaronis (2001).

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Comment

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This is an interesting paper, both for its subject matter and its empirical techniques. The subject matter—part of the general strand of analysis of the impact of different exchange rate regimes—is one of contemporary relevance, not least in the Asian region, where there is a vigorous debate on questions of exchange rate policy, including the possible future development of a common regional currency.

The main result presented in the paper is that independent currency union (ICU) countries have lower inflation, higher GDP growth, and higher growth volatility than countries with their own currencies.

This result comes from an analysis using a treatment effects model that allows for the likelihood that ICU countries are not randomly selected, but are in fact ICU countries because of their particular characteristics. By comparing the ICU countries with the non-ICU countries with similar characteristics, the non-random selection problem is avoided.

There remains the problem—which the authors recognize—that there could be other variables omitted from the model altogether which account for the ICU outcomes. There are reasons to believe this is a real problem with the paper—we will return to this later.

But even if we take the econometrics as sound, there remain some questions in interpreting the results.

First, the results are in principle obtained by comparing ICU countries with countries equally likely to be ICU countries (as is perhaps clearest in the matching estimators tests, but the treatment effects work is essentially doing the same thing). But why aren't they ICU countries as well? Are they countries with pegged exchange rates? If not, to what extent are the results dependent on the fixed exchange rate rather than the ICU arrangement itself?

21. The content of these comments reflects the views of the author alone, which are not necessarily shared by the Reserve Bank of Australia.

The authors address this question in a limited way by comparing the results obtained in this paper for ICU countries with those obtained for dollarized countries, which had also been the subject of an earlier paper (Edwards and Magendzo [2001]). The issue needs to be addressed more broadly, at least for other hard-peg countries.

Second, why do the results differ between ICU and dollarized countries? For the latter, in their earlier study, the authors found that dollarized countries have lower inflation, *lower* GDP growth, and higher growth volatility (though the authors' earlier paper found no significant difference in volatility).

Third, to what extent might the results depend on the performance of the countries to which the ICUs (or the dollarized countries) have pegged their exchange rates?

Fourth, the results are clearly driven by the ECCA countries. These countries are quite distinctive—very small, with strong historical/political linkages, and with economies heavily geared to tourism and rural production. Their distinctiveness raises the issue noted above of omitted variables—are there some variables, not appearing in the model, which account for the performance of the ECCA countries?

If the empirical results in the paper—that being in an ICU lowers inflation and increases growth—are valid, do we have a theoretical explanation for them?

First, if the ICU is seen merely as a monetary policy choice, the inflation results seem plausible but the real growth results do not, at least insofar as they are directly related to the monetary policy choice itself. Of course, some would argue that a reduction in inflation is positive for growth (this is, after all, a common underpinning of inflation targeting). But if this is the channel for ICU to higher growth, why do the authors find that dollarized countries achieve lower inflation but with *lower* growth?

Second, the ICU might be seen as eliminating exchange rate uncertainty and hence increasing trade and/or investment. It could also be seen as part of a general reduction in trade costs, because of the ancillary arrangements that characterize ICUs. Does increased trade follow? If so, does it lead to increased growth? And if the answer to both questions is yes, why shouldn't we again find the same result for dollarized (or even hard-peg) countries? Moreover, would all these effects—if they exist—lead to increased growth, or just to a one-off increase in the level of GDP?

Finally, some questions arise as to how we could apply these results to guide policy choices for other countries—and especially, since we are in Asia, to countries in this region.

First, countries in this region tend to be open (and some extremely so). Second, they tend to be large (at least in comparison with ECCA countries). The authors find these characteristics to be pointers toward a low probability of being an ICU country. And of the other factors that point to a higher probability—common borders, distance from international markets, and being islands—none seem particularly strong. In the Asian region, at least, the paper's results seem to have little relevance for policy choices.

To the extent that currency union is debated in Asia, it is within a context of increasing integration of trade and capital markets in the future. It is part of a political debate, rather than a narrowly economic one. And that leaves me wondering again about the likelihood of there being some variables, omitted in the present paper, that might lead to answers to at least some of the questions I have posed.

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Edwards, Sebastian, and I. Igal Magendzo, "Dollarization, Inflation and Growth," NBER Working Paper No. 8671, National Bureau of Economic Research, 2001.

General Discussion

I. Igal Magendzo responded to the comments of the discussants as follows. First, regarding the difference between independent currency unions (ICUs) and dollarization, he explained that the former arrangement did not necessitate complete abandonment of seigniorage and monetary policy. Concerning the channel through which ICU affected economic performance, Magendzo stated that possible channels included reductions in the cost of capital and growth in trade volume. He also reported that the results remained robust when changes were made in econometric methods and choice of explanatory variables. Magendzo went on to state that the paper represents no more than a starting point, and the application of its estimation results to other regions should be undertaken with due caution and in reference to the experiences of the European Monetary Union (EMU) and others.

Some participants questioned the statistical treatment of ICU endogeneity. Jürgen von Hagen argued that Magendzo's paper was subject to selection bias because the impact of economic management undertaken to satisfy accession requirements has been treated as the economic effect of ICUs.

Stefan Gerlach, Werner Hermann (Schweizerische Nationalbank), and Vittorio Corbo commented that the model did not include various explanatory variables necessary in estimating economic performance. Among those cited were relations of ICU member countries with their former colonial rulers, degree of development of legal infrastructure, and economic size. Shigenori Shiratsuka (Bank of Japan) suggested that the effects of the ICU on growth and inflation rates should be estimated simultaneously because of their interdependence. Robert H. Rasche suggested that the same currency equation should be used in the estimation of growth and inflation rates. Magendzo responded that statistical tests have indicated that there was no selection bias, and that the legal infrastructure was not a significant explanatory variable.

The following methodological suggestions were presented on how to make effective use of panel data. Linda S. Goldberg suggested using a fixed-effects estimator, Corbo suggested the possibility of using the time effect, and Reuven Glick suggested the use of cross-sectional analysis. Masahiro Kawai suggested that the long-term cumulative effect of exchange rate regimes on economic performance should be analyzed.

The following comments were made concerning background factors contributing to the high performance of ICU countries. Shiratsuka asked what were the specific institutional factors that explain it, while Roberto Rinaldi and Jorge A. Braga de Macedo pointed to the positive impact of monetary policy coordination by ICU countries on their fiscal and structural policies. Goldberg commented that the estimation results show that ICUs have a very high cumulative effect on growth

(1 percent), and asked whether this could be attributed completely to the choice of exchange rate regimes.

Commenting on the very high growth rates achieved by the East Caribbean Currency Area (ECCA), Angel Palerm questioned whether these were due to currency arrangements or, more likely, to other structural factors. Robert W. Rankin pointed out that the high growth rates could not be attributed to trade, because intra-regional trade accounted for less than 5 percent of the trade of ECCA countries. Kawai also was skeptical of the ICU effect, and emphasized the potential importance of development strategies other than exchange rate regimes adopted by the ECCA. Commenting on the fact that the ECCA had switched its peg from the pound to the dollar, Roger W. Ferguson, Jr. asked to what degree economic performance had been affected by this change.

Jerry L. Jordan and Rankin argued that the estimation results of the paper implied that, rather than moving toward dollarization, it was more desirable for Canada and Mexico to form a currency union and adopt a dollar peg. Jordan went further to state that the background to this was unclear.