EXECUTIVE SUMMARY

The analytical work associated with the 2006 Eastern Caribbean Currency Union Regional Discussions continues the staff's work on defining the policy agenda to enable the Eastern Caribbean Currency Union (ECCU) region to reduce vulnerabilities and move to a sustained growth path.

The ECCU is both a monetary union and—with the gradual integration of labor, capital and goods markets—increasingly an economic union. However, **Chapter I: Income Dispersion and Co-Movement in the ECCU** finds that incomes are diverging, with the Leeward Islands converging to a higher income level than the Windward Islands. Cyclical movements in per capita income appear, though, highly synchronized among ECCU countries. Continued progression toward a formal economic union (by lowering obstacles to the free movement of persons, goods and capital) could contribute to a lowering of income disparities in the ECCU.

Trade preferences for the export of bananas to the European Union have afforded the Windward Islands with large—yet declining—implicit assistance. **Chapter II: The Macroeconomic Impact of Trade Preference Erosion on the Windward Islands** demonstrates the substantial impact from preference erosion on growth, trade balances and fiscal positions. While much of the macroeconomic impact of preference erosion has already been experienced by ECCU economies, a challenge remains in ameliorating the adverse social effects of employment loss and declining producer incomes.

Chapter III: The Size of the Informal Economy in the Caribbean finds considerable variation in the region, with estimates for the early 2000s ranging from a low of around 15 percent of measured GDP for The Bahamas to a high of over 50 percent of measured GDP for St. Vincent and the Grenadines. Key determinants include the tax burden, the size of the agriculture sector, and the significance of labor rigidities. This suggests the potential for significant revenue gains from tax reforms to increase compliance and broaden tax bases.

Population aging and the maturation of the schemes present major challenges to the defined-benefit social security schemes of the ECCU **(Chapter IV: Social Security in the ECCU)**. In the absence of reform, the region's social security schemes will soon begin to incur large cash flow deficits and declining reserves. The adverse effects of this process are amplified by the very prominent role played by social security in ECCU economies as a major investor and depositor in the banking system. Reforms have recently been introduced in some ECCU countries, but early action in other countries would minimize any negative economic impact.

While investment-to-GDP ratios across the ECCU are relatively high, the growth returns have been disappointingly low **(Chapter V: Domestic Investment and the Cost of Capital)**. Private domestic investment—a potential catalyst for growth—displays limited multiplier effects from public investment and FDI and is highly sensitive to the cost of capital. Thus public policy to stimulate private domestic investment in the ECCU should focus on creating conditions for lowering the cost of capital, rather than extending costly tax concessions in an attempt to attract FDI.

I. INCOME DISPERSION AND CO-MOVEMENT IN THE EASTERN CARIBBEAN CURRENCY UNION[1]

A. Introduction

1.   **The Eastern Caribbean Currency Union is a monetary union that is increasingly moving toward economic union.** The island economies of the currency union share similar economic and institutional structures, and an important question is whether the process of deepening economic integration has led to convergence of income levels and cyclical fluctuations across members of the currency union? In principle, as integration deepens there should be an intensification in trade, financial and migration links across national boundaries, which lays the groundwork for a convergence of national incomes and business cycles (Frankel and Rose, 1998). An alternative view is that increasing trade integration can engender increased industrial specialization by country, and thereby yield more asynchronous business cycles due to industry-specific shocks.

2.   **The goal of this chapter is to establish key stylized facts regarding income convergence in Eastern Caribbean Currency Union (ECCU) countries.** Examination will be made of both the process of convergence of long-run (trend) income levels and whether there has been synchronization of business cycles (deviation from trend income levels). These issues are important as they have implications for the role of national fiscal policies and region-wide monetary policy in countering shocks to the evolution of incomes in the ECCU.

3.   **The plan of this chapter is as follows.** The data are briefly described in Section B. In Section C the evidence for income convergence among ECCU countries is examined, while Section D analyses comovement in ECCU income trends. Comovement of ECCU output cycles and the persistence of income shocks are set out in Section E. Section F concludes.

B. Data

4.   **Data used in the empirical analysis include series on domestic output and per capita output.** The macroeconomic time series cover the six Fund-member countries (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines) and the two United Kingdom territories (Anguilla and Montserrat), which constitute the eight members of the ECCU.[2] The logarithm of annual real GDP (in millions of Eastern Caribbean dollars, base year 1990) is used to measure real output in each

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[1] Prepared by Paul Cashin and Ping Wang.

[2] While the ECCU consists of six independent countries and two territories of the United Kingdom, for ease of exposition all eight jurisdictions will be denoted as countries in this chapter.

jurisdiction.[3] Real per capita output is derived using population measures taken from the IMF's *International Financial Statistics*. Data series are annual in frequency, and cover the period 1977 to 2005. All macroeconomic time series are converted into logarithms for the empirical work.

5.   **Real per capita output in Fund-member ECCU countries has grown at different rates.** Figure I.1 plots the path of ECCU real per capita output over the past three decades—the strong post-1977 growth performance of St. Kitts and Nevis is revealed in the data, as is the mediocre growth performance of Dominica and St. Lucia.

C. Growth and Convergence

6.   **Economic growth in the countries of the ECCU has been rather volatile** (Rasmussen and Tolosa, 2006). During this growth process, have flows of goods, labor, capital, and remittances served to equalize per capita incomes across member countries of the ECCU? Following the empirical growth literature, we measure the extent of σ-convergence—that is, we examine whether the dispersion of real per capita incomes across the economies of the ECCU have tended to fall over time, which would indicate that income levels in the rich and poor countries of the ECCU are becoming more similar. In analyzing σ-convergence it is assumed that ECCU countries share the same long-run equilibrium level of per capita income, determined by common technologies and common preferences for saving.

7.   **Overall, there has been income divergence in the ECCU over the past three decades.** Figure I.2 shows the cross-sectional standard deviation of the logarithm of real per capita income. We observe that the dispersion rose from about 0.42 in 1977 to reach about 0.53 by 2002, and then narrowed to reach about 0.50 by 2005. While the dispersion of per capita incomes was broadly stable in the 1980s and 1990s, after that time income divergence occurred across the countries of the ECCU, with a minor reversal since the turn of the century.[4]

8.   **However, there does appear to be income convergence within subgroups of ECCU countries.** Following Norman and Walker (2004), we separate the eight countries into two subgroups (or convergence clubs)—on the basis of economic similarities and geographic proximity—and examine whether there is income convergence among the members of each 'club.' For this purpose, we divide the ECCU into a Leeward Islands club

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[3] The annual national accounts GDP data are taken from the Eastern Caribbean Central Bank (ECCB), the IMF's *International Financial Statistics* and *World Economic Outlook* databases, and from Fund staff estimates.

[4] In the Caribbean context, Atkins and Boyd (1998) find weak evidence of income convergence over the period 1960–92.

(Anguilla, Antigua and Barbuda, Montserrat, and St. Kitts and Nevis) and a Windward Islands club (Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines). The results illustrate that income dispersion within the Leeward and Windward Islands clubs has fallen over the last three decades, with dispersion falling relatively faster among the Leeward Islands (Figure I.3).

9.   **Similarly, while there is little evidence of income 'catch up' for the ECCU as a whole, there is income catch up within the two ECCU clubs.** A simple scatter plot of initial real per capita income in 1977 and the rate of growth in subsequent decades yield a negative (yet not statistically significant) relationship for the ECCU (Figure I.4). Accordingly, there is little evidence of incomes of the initially poor countries converging on those of the initially rich (as would be implied by the Solow-Swan neoclassical growth model). However, there is evidence of an inverse relationship between initial income and subsequent growth, for both the Leeward and Windward Islands (Figures I.5 and I.6).

D. Income Trends

10.   **An analysis of the extent of comovement between measures of output requires the separation of income series into trend and cyclical components.** As such, we use a business cycle filter that will eliminate the slowly-evolving, long-term ("trend") component and the rapidly-varying ("irregular") component of real GDP, leaving behind the short-term ("business-cycle") component of real GDP. In separating the income data into its trend (nonstationary) and cyclical (stationary) components we use the frequency domain (FD) filter developed by Corbae and Ouliaris (2006). The FD filter is a univariate detrending technique that removes the low-frequency (trend) and high-frequency (irregular) components of the data, leaving behind the business cycle components.[5] Following Cashin and Ouliaris (2004) and Burns and Mitchell's (1946) 'cycle dating rules,' the cyclical component is set at frequencies of between two and eight years.

11.   **The trend component of ECCU real per capita incomes are all rising** (Figure I.7). The extracted trend components of per capita income reveal the slowdown in rates of growth in the early 1990s, apart from St. Kitts and Nevis, Grenada and St. Vincent and the Grenadines. Montserrat stands out as having greater income volatility than the other ECCU jurisdictions, most likely induced by the natural disasters (volcanic eruptions) of the

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[5] Corbae and Ouliaris (2006) propose a new approach to estimating the growth cycle that starts from the level of a time series. Using frequency domain techniques and recent developments in spectral regression for nonstationary time series, they propose an approximate "ideal" band pass filter for estimating deviations from trend (which need not be linear). Using Monte Carlo simulations, they demonstrate that the new filter has superior statistical properties to other popular filters (such as Hodrick and Prescott, 1980; Baxter and King, 1999). In particular, they show that the FD filter, in contrast to the other two filters, is statistically consistent in the sense that the filtered series asymptotically converges to the true deviation-from-trend cycle.

mid−1990s. Ocular methods suggest that the four Leeward Islands (Antigua and Barbuda, Anguilla, St. Kitts and Nevis, and Montserrat) share a common trend in their outputs, while the four Windward Islands (Dominica, Grenada, St. Lucia and St. Vincent and the Grenadines) share a common, yet smaller, trend.

E. Income Cycles, Co-movement and Shock Persistence

12.   **Another important aspect of convergence concerns short-term income cycles (deviation from trend movements).**[6] The (stationary) cyclical component of ECCU per capita incomes are strongly correlated, except for those of Montserrat (Table I.1).[7] Anguilla, for example, is highly correlated with Antigua and Barbuda and St. Kitts and Nevis. Similarly, St. Vincent and the Grenadines is highly correlated with Dominica and St. Lucia. Figure I.8 sets out the cyclical component of real per capita income in the ECCU. The cycles appear to be well synchronized, except for Montserrat which displays a cycle with a much greater amplitude. In addition, cyclical movements in income across ECCU countries appear to be particularly synchronous since the mid-1990s. These results concord with the view of Frankel and Rose (1998), who argue that if exchange rates are successfully pegged, and trade and financial links develop, then national business cycles within currency unions are likely to converge.[8] [9]

13.   **As part of the convergence process, the synchronicity of the cross-correlations among national business cycles may have changed over time.** Accordingly, we calculate rolling correlations of per capita income cycles (using a 10-year window) among the members of the Leeward and Windward Islands. For the Leewards, the results indicate that while the cycles of Anguilla, Antigua and Barbuda and St. Kitts and Nevis are highly synchronized and stable over time, the synchronicity of Montserrat cycles with other

[6] Earlier analyses of Caribbean business cycles include Mamingi (1999), Borda, Manioc and Mantauban (2000), Craigwell and Maurin (2002), and Cashin (2006). See also Cashin and Wang (2005) for an examination of comovement of Caribbean cyclical output and key macroeconomic variables.

[7] We performed Phillips-Perron unit root tests on cyclical components of all series, derived with the FD filter, and confirmed that the cyclical component of all real output series were stationary. The results of these unit root tests are not reported, but are available upon request.

[8] Rose and Engel (2002) also find that countries that use the same currency tend to have highly synchronized business cycles. The direction of causality is of interest here. While it is true that countries with synchronized business cycles are more likely to adopt a common currency, it is also true that members of a currency union should experience more synchronized business cycles (given the absence of idiosyncratic monetary policy shocks).

[9] Using data for the ECCU and several Caribbean countries which maintain a fixed exchange rate regime, Fielding and Shields (2005) find that there is no evidence that the members of a monetary union (which share a common currency) experience a greater degree of business cycle convergence than countries which share a common peg.

Leeward countries has been decreasing over time (Figure I.9). For the Windwards, there has been a general increase in synchronicity of cycles over time, albeit from an initially low level of comovement (Figure I.10).

14.   **We can also examine income convergence by analyzing the persistence of shocks to per capita output.** Accordingly, we follow Alexiadis and Tomkins (2004) and define the dependent variable in an autoregressive model as: (i) the logarithm of the differential between national and ECCU average per capita incomes; and (ii) the logarithm of the differential between national and 'club' average per capita incomes. Rather than consider the whole impulse response function to gauge the degree of persistence, we follow Rogoff (1996) and use a scalar measure of persistence that summarizes the impulse response function: the half-life of a unit shock (HLS). For a first-order autoregressive model (with autoregressive parameter $\alpha \geq 0$), the HLS gives the length of time until the impulse response of a unit shock is half its original magnitude, and is defined as $HLS = ABS(\log(\frac{1}{2})/\log(\alpha))$. A short half life for the income differential indicates that any deviation in national per capita income from the ECCU mean per capita income (or 'club' mean per capita income) is short-lived, while a long half life indicates the opposite.

15.   **Our findings indicate that the persistence of income shocks varies across ECCU countries** (Table I.2). Differentials between national income and the ECCU average income for the Windward Island countries are typically longer than for their Leeward Island counterparts. However, the persistence of shocks to income differentials defined as the deviation of national incomes from the club average (common steady-state income) is typically shorter for Windward Island countries. The calculated half lives of income differentials are all finite, so there is a tendency (albeit sometimes slow) for income differentials to shrink. Importantly, St. Kitts and Nevis displays long-lived shocks of its income from both the ECCU average and the Leeward Islands club average, while St. Vincent and the Grenadines' income differential also takes a long time to return to the Windward Islands' club mean income. The results for both countries reflect that their growth performance over the sample period has been considerably better than both the ECCU average and Leeward Islands average (for St. Kitts and Nevis) and better than the Windward Islands average (for St. Vincent and the Grenadines).

F. Conclusions

16.   **This chapter has examined trends and cycles in ECCU per capita incomes.** While the neoclassical growth model would suggest that if economies are similar then their per capita incomes should be converging to a common long-run steady state, little evidence is found that per capita incomes in the ECCU are converging to a common region-wide equilibrium.

17.   **Analyses of comovement of national trend incomes reveals that there are two possible convergence 'clubs' in the ECCU—the Leeward Islands and the Windward Islands.** Similarities in structural and technological conditions are likely to have engendered these region-specific convergence clubs. Based on trend real per capita incomes, it appears that the members of each 'club' are converging to their own long-run equilibrium level of income. Importantly, the long-run equilibrium income level for the Windwards club appears to be considerably below that of the Leewards club.

18.   **There is strong evidence for synchronization of the cyclical component of per capita incomes in the ECCU.** National income cycles (measured as percentage deviation from trend income) reveal that while there is some variation in the 1970s and 1980s, cyclical movements in income have been well coordinated since the mid-1990s. This comovement of ECCU business cycles implies that the members of the currency union experience broadly similar shocks to output.

19.   **Among monetary and economic unions, the existence of large and persistent differences in national or regional per capita incomes has typically been regarded as reflective of an incomplete process of economic integration.** Given the loss of independent national monetary policies inside monetary unions, reducing any divergence of per capita incomes requires additional measures to promote the freer flow of factors and the transferal of resources from high-income to low-income regions.

20.   **The creation of a single economic space within the Organization of Eastern Caribbean States could contribute to a lowering of income disparities.**[10] The *Treaty of Basseterre*, which established the OECS in 1981, provides for the essential elements of an economic union by calling for the removal of obstacles to the free movement of persons, goods, services and capital. In October 2002 the OECS Authority reiterated its commitment to the creation of an OECS Economic Union, but since that time there has been slow progress on the removal of restrictions on the flow of factors and goods across the borders of OECS countries (Mlachila et al., 2006).[11]

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[10] The Organization of Eastern Caribbean States (OECS) consists of the eight member countries and territories of the ECCU and the British Virgin Islands.

[11] In June 2006 the OECS Authority reviewed the new draft OECS Treaty, and members signed a Declaration of Intent which affirmed their commitment to the establishment of an OECS Economic Union by July 2007.

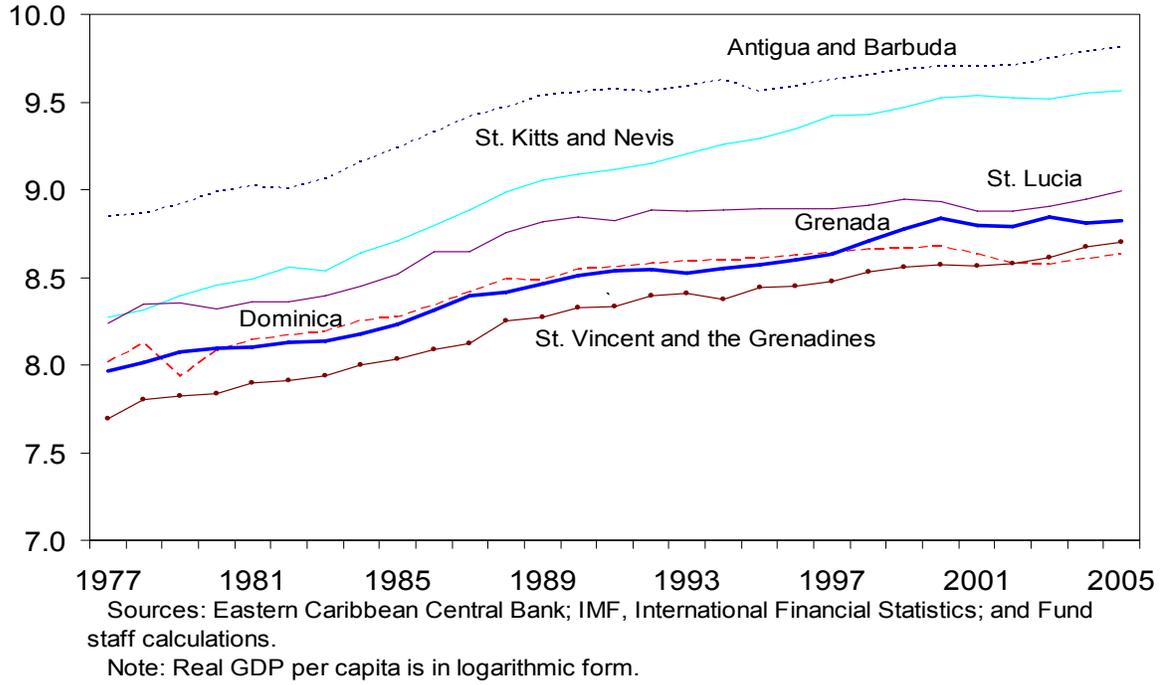Figure I.1. ECCU: Real GDP Per Capita, 1977–2005

Antigua and Barbuda

St. Kitts and Nevis

St. Lucia

Grenada

Dominica

St. Vincent and the Grenadines

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff calculations.
Note: Real GDP per capita is in logarithmic form.

Figure I.2. ECCU: Standard Deviation of Real Per Capita Income, 1977–2005

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff estimates.
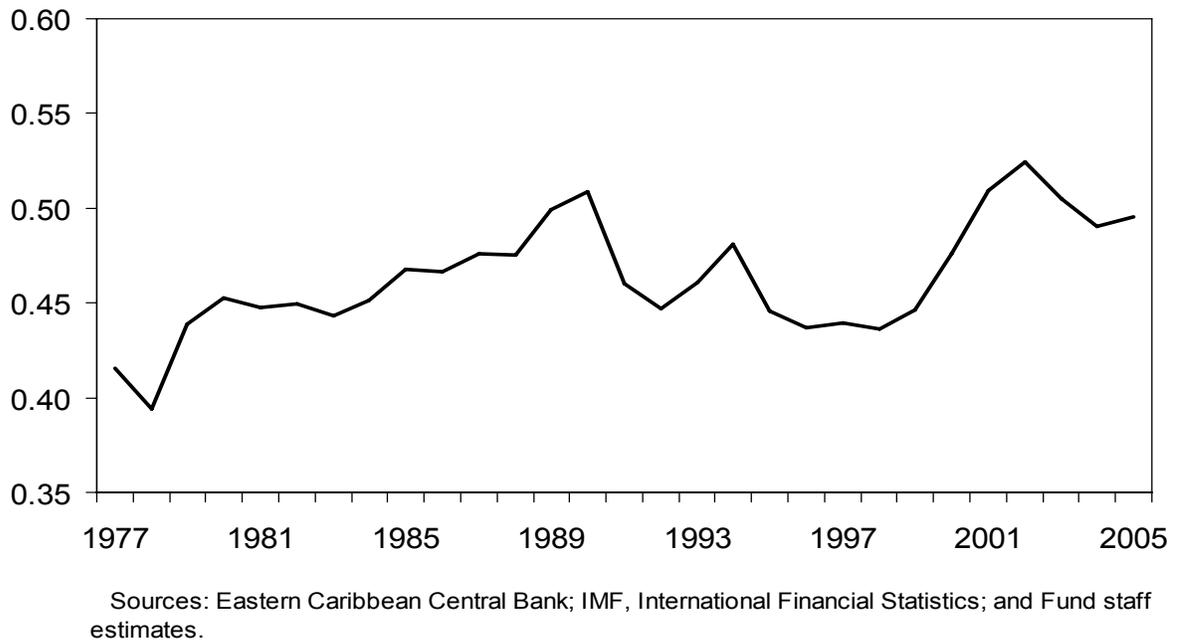
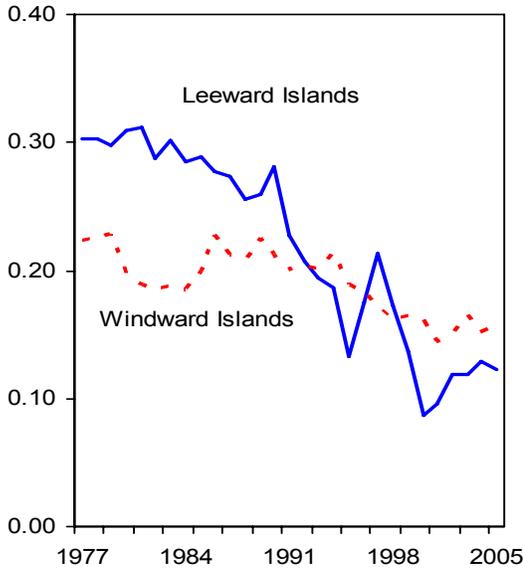Figure I.3. ECCU: Standard Deviation of Real Per Capita Income by Clubs, 1977–2005
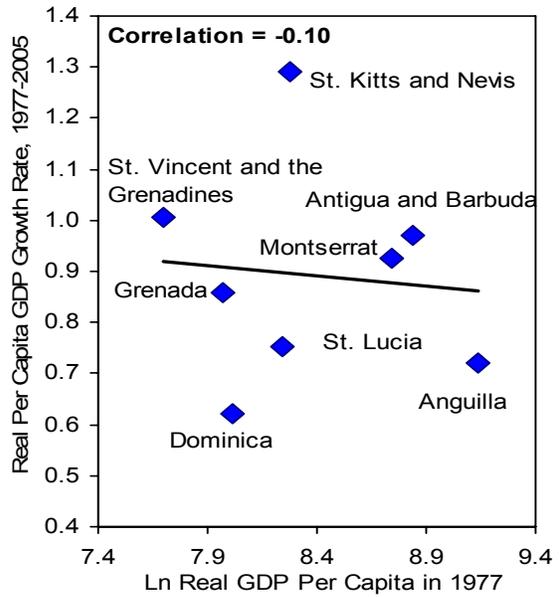
Figure I.4. ECCU: Income Convergence

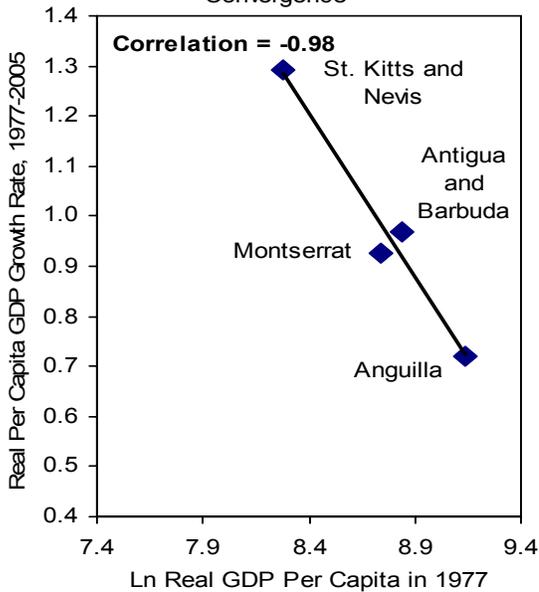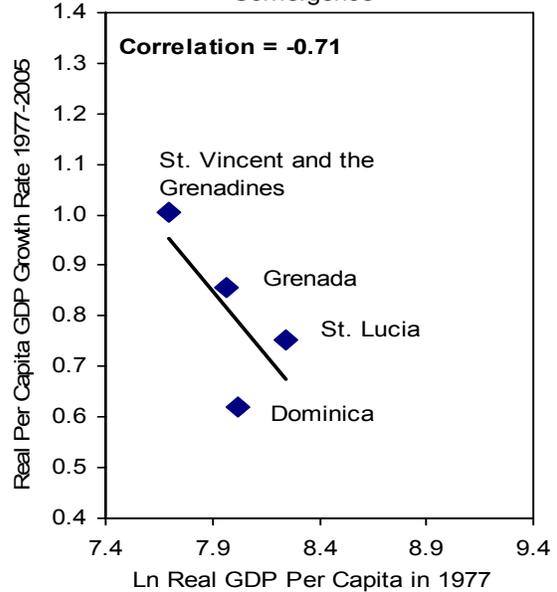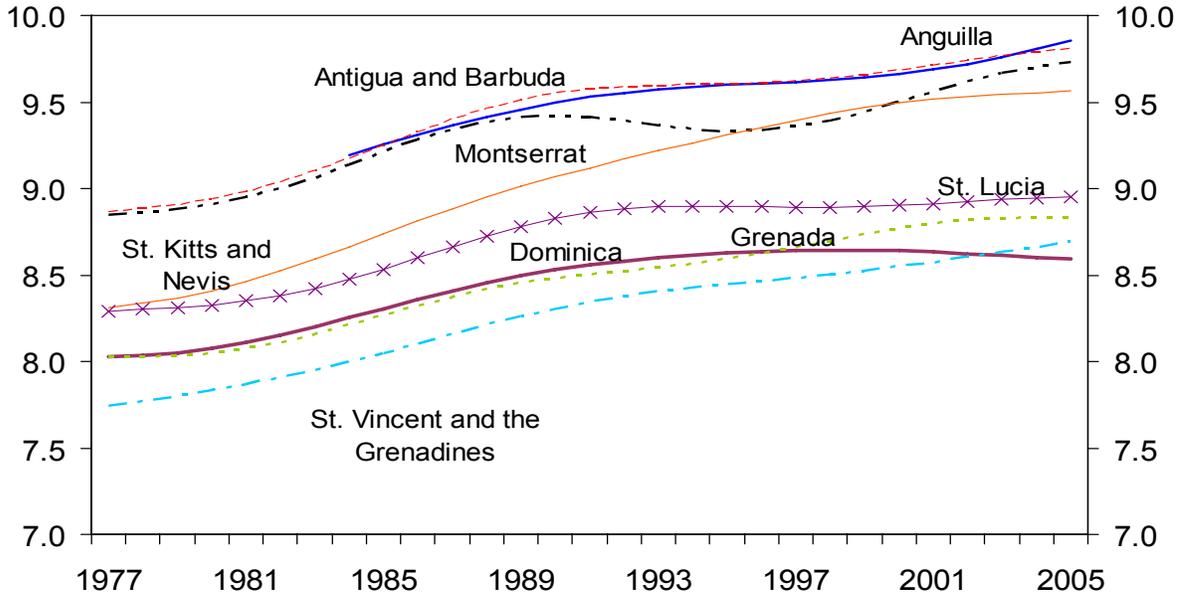Figure I.5. Leeward Islands: Income Convergence

Figure I.6. Windward Islands: Income Convergence

Sources: Eastern Caribbean Central Bank, IMF, International Financial Statistics; and Fund staff estimates.

Note: Leeward Islands consist of Anguilla, Antigua and Barbuda, Montserrat, and St. Kitts and Nevis. Windward Islands consist of Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines.
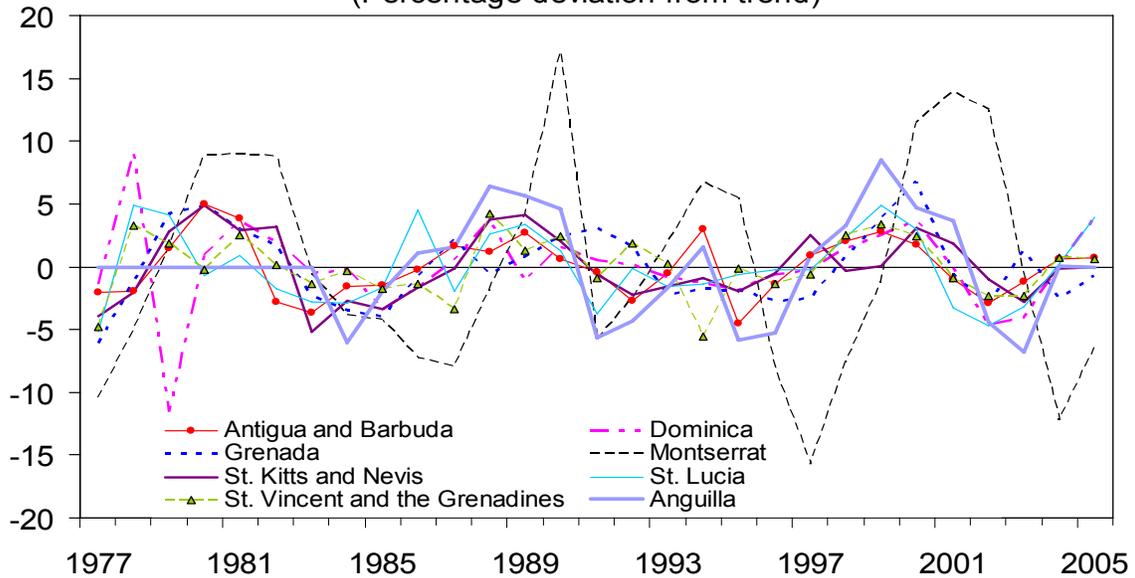
Figure I.7. ECCU: Trend Component of Real Per Capita Income, 1977–2005

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff estimates.
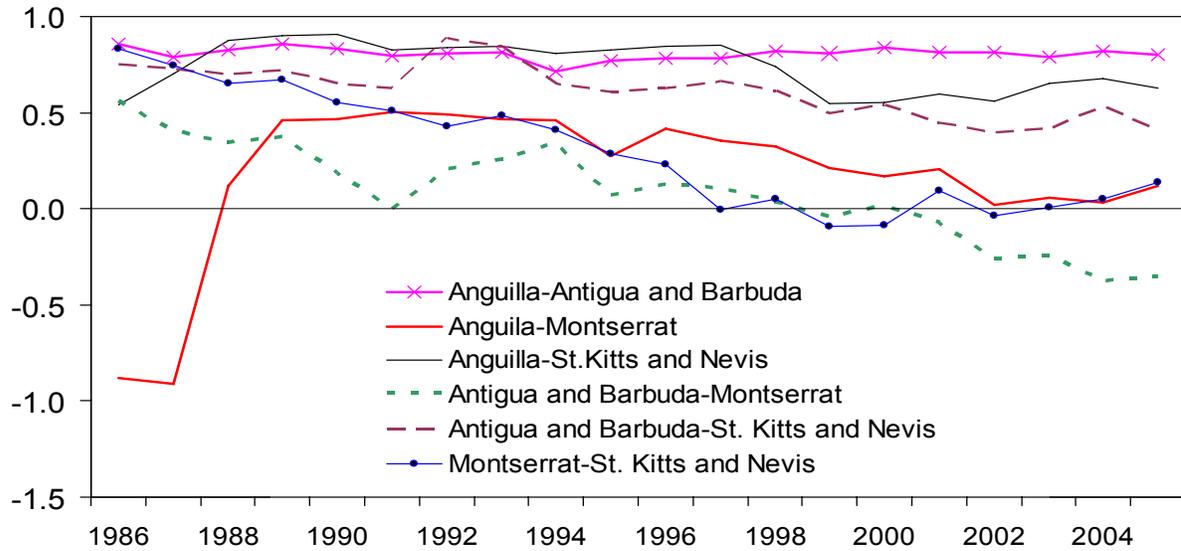Note: Real GDP is in logarithmic form.

Figure I.8. ECCU: Cyclical Component of Real Per Capita Income, 1977–2005
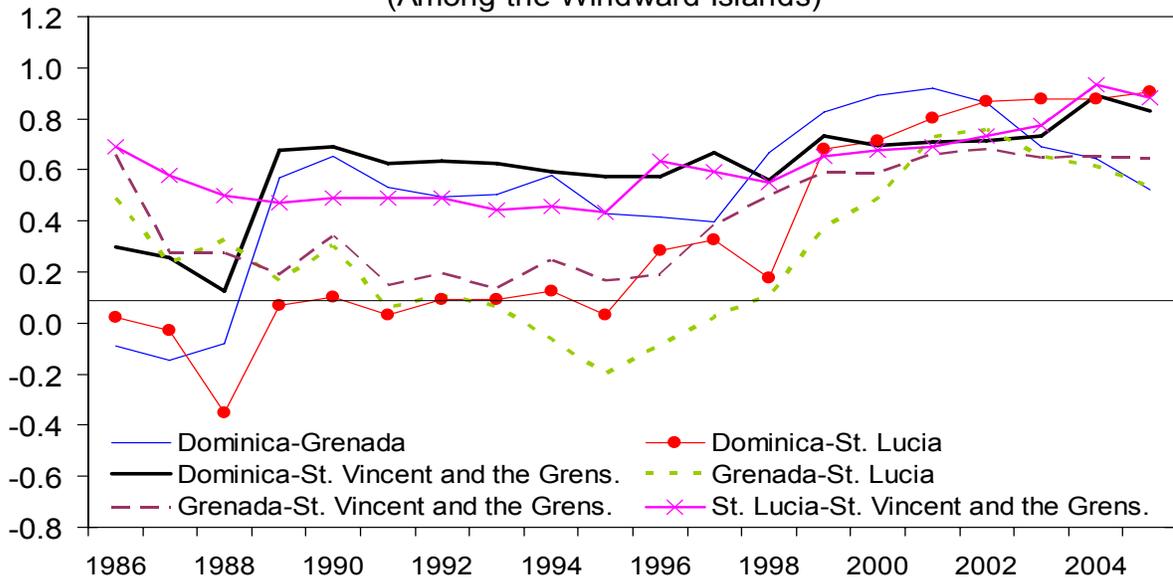(Percentage deviation from trend)

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff estimates.

Figure I.9. ECCU: Rolling Correlation of Real Per Capita Income Cycles
(Among the Leeward Islands)

Legend:
- Anguilla-Antigua and Barbuda
- Anguila-Montserrat
- Anguilla-St.Kitts and Nevis
- Antigua and Barbuda-Montserrat
- Antigua and Barbuda-St. Kitts and Nevis
- Montserrat-St. Kitts and Nevis

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff estimates.

Figure I.10. ECCU: Rolling Correlation of Real Per Capita Income Cycles
(Among the Windward Islands)

Legend:
- Dominica-Grenada
- Dominica-St. Lucia
- Dominica-St. Vincent and the Grens.
- Grenada-St. Lucia
- Grenada-St. Vincent and the Grens.
- St. Lucia-St. Vincent and the Grens.

Sources: Eastern Caribbean Central Bank; IMF, International Financial Statistics; and Fund staff estimates.

Table I.1. ECCU: Correlation Between Cycles of Per Capita Income, 1977–2005

	Anguilla	Antigua and Barbuda	Dominica	Grenada	Montserrat	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
Anguilla	1.00	0.78	0.58	0.42	0.20	0.74	0.67	0.49
Antigua and Barbuda		1.00	0.53	0.42	-0.11	0.57	0.54	0.19
Dominica			1.00	0.53	-0.07	0.56	0.61	0.66
Grenada				1.00	0.27	0.39	0.36	0.41
Montserrat					1.00	0.23	-0.14	0.04
St. Kitts and Nevis						1.00	0.43	0.47
St. Lucia							1.00	0.62
St. Vincent and the Grenadines								1.00

Source: Authors' calculations.

Note: Following Agénor, McDermott and Prasad (2000), the approximate standard error of the correlation coefficients, computed under the null hypothesis that the true correlation coefficient is zero, is 0.19 (given T=28).

Table I.2. ECCU: Half-Lives of Income Deviations

Country/Territory	ECCU		Leeward Islands		Windward Islands	
	α	Half-life (in years)	α	Half-life (in years)	α	Half-life (in years)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Anguilla	0.36	0.68	0.68	1.80	...	...
Antigua and Barbuda	0.65	1.61	0.93	9.55	...	...
Dominica	0.87	4.98	...	...	0.76	2.53
Grenada	0.79	2.94	...	...	0.82	3.49
Montserrat	0.76	2.53	0.83	3.72	...	...
St. Kitts and Nevis	0.96	16.98	0.96	16.98	...	...
St. Lucia	0.92	8.31	...	...	0.88	5.42
St. Vincent and the Grenadines	0.72	2.11	...	...	0.95	13.51

Source: Authors' calculations.

Note: The results in columns 2, 4 and 6 are based on least-squares estimations of an autoregressive (AR(1)) model. The half-life is the length of time it takes for a unit impulse to dissipate by half. It is derived using the formula: HLS = ABS(log(1/2)/log(α)), where α is the autoregressive parameter from the AR(1) model. The dependent variable is: the log difference between national income and ECCU average income (columns 2-3); the log difference between national income and Leeward Islands average income (columns 4-5); and the log difference between national income and Windward Islands average income (columns 6-7).

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