A NOTE ON INCOME CONVERGE EFFECTS IN REGIONAL INTEGRATION AGREEMENTS

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Abstract

This paper investigates the extent of per-capita income convergence in regional integration initiatives. Panel unit root testing is performed on 28 regional groupings. There is evidence of convergence in South-South integration, but this might be taking place to the bottom.

Keywords: Regional integration, Income convergence**,** Heterogeneous dynamic panels.

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1. Issues and methodological approach

The wave of regionalism in the '90s has spurred academic and professional interest towards the economic effects of regional integration agreements (RIAs). Among the most debated issues is the one of whether or not a RIA stimulates the convergence of per-capita incomes across its participants. The existing empirical literature is not conclusive. Ben-David (1993 and 1996) documents income convergence in the European Union (EU). However, for other RIAs the evidence is of a substantial lack of convergence or even divergence (i.e. Karras, 1997). In a recent theoretical contribution, Venables (2003) suggests that income dispersion across countries in a RIA will decrease only in the case of North-North integration[1].

The purpose of this note is to expand the body of empirical evidence by testing for intra-regional income convergence in a wide sample of RIAs. Let y_i and y_R indicate (log) real per-capita income in country i and average (log) real per-capita income in the RIA respectively. The number of countries in the RIA (including i) is N. Let also t represent a generic time. Convergence is defined as a situation where the difference (y_{it} - y_{Rt}) evolves into a stationary process. This is indeed a notion of convergence in expectations which has been widely adopted in the literature (see Hall et al. 1997 and Montuenga-Gomez, 2002).

The unit root test is carried out within the panel framework developed by Im et al. (2003). The time-varying difference (y_{it} - y_{Rt}) is assumed to be generated by an AR(1) process:

[1] For a survey of the previous theoretical and empirical work see Schiff and Winters (2003, Chapter 5).

(1) $(y_{it} - y_{Rt}) = \phi_i (y_{it-1} - y_{Rt-1}) + X_{it}\delta_i + \varepsilon_{it}$

and hence, using the notation $z_t \equiv (y_{it} - y_{Rt})$

(2) $\Delta z_{it} = \beta_i z_{it-1} + X_{it}\delta_i + \varepsilon_{it}$

where $\beta_i = (1-\alpha_i)$ and $\Delta z_{it} = z_{it} - z_{it-1}$, X are exogenous regressors which may consist of a constant or a constant and a linear trend, δ_i and β_i are parameters to be estimated, and the ε_{it} are white noises. The model can be extended to allow for lagged effects of the dependent variable Δz_i:

(3) $\Delta z_{it} = \beta_i z_{it-1} + \sum_{j=1}^{J} \Delta z_{it-j} + X_{it}\delta_i + \varepsilon_{it}$

Given the AR model (3), the null hypothesis of unit roots becomes

(4) $H_0 : \beta_i = 0$ for all i against the alternatives

$H_1 : \beta_i < 0$, $i = 1, 2 \ldots . N_1$, $\beta_i = 0, i = N_1 + 1, N_2 + 2 \ldots . N$.

Rejection of the null then implies that the stochastic process z_i converges for all i and hence that per-capita incomes across member-states in the RIA tend to converge.

Two other approaches might be used in testing for convergence within a panel framework of the type just outlined. First, following Levin et al. (2002), one could set $\phi_i = \phi$ in equation (2) and hence $\beta_i = \beta$ in equations (2) and (3). The resulting null hypothesis would be stated as $H_0 : \beta = 0$ against the alternative $H_1 : \beta < 0$. This formulation is however less general than (4). In fact, (4) allows for β_i to differ across countries. It also allows for some (but not all) countries not to converge under the alternative hypothesis. Because of the cross-country heterogeneity that often characterizes the membership of RIAs, formulation (4) appears more appropriate. The second alternative approach follows Ben David (1996), who tests for convergence excluding additional regressors X from equation (2). Again, (4) provides a more general setting and hence it is preferred.

One final issue in implementing the convergence test is to decide how many lags of Δz_i should be added on the r.h.s. of (3) and what variables the set of regressors X should actually include. The lag-structure is chosen to minimise the Schwarz Information Criterion. With respect to the specification of X, instead, a more pragmatic approach is taken: results are reported for two versions of the unit root test, with and without individual linear trends.

2. Results and discussion

The results of the convergence test on 28 groupings, covering a total of more than 100 countries, are displayed in the table below. For each RIA, the test is carried out over a sample period that spans from the year of founding (or notification to GATT/WTO) until 2004. For some RIAs, the test cannot cover their entire membership, since data are missing for a few countries. When membership of a RIA changes over time, the test is separately run on the sample of countries before and after the change. However, if the change occurred after 1996, then no separate test is run. Thus, for instance, APEC was funded in 1989; Mexico, Papua New Guinea and Chile joined in 1993-94, whilst Russia, Peru and Vietnam joined in 1998. Then, two tests are run for APEC: one on the original group of countries (APEC 1) over the period 1989-2004 and one on the original countries plus Mexico, Papua and Chile (APEC 2) over the period 1994-2004. No test is run on APEC 2 plus Russia, Vietnam and Peru since this would constitute a panel with a too short time dimension. Sample periods and countries of the test are indicated in the first column of the table[2].

For each RIA, the column labelled “version 1” reports the test-statistic from the version of the AR equation (3) which includes only individual constants. The column labelled “version 2” reports instead test-statistics from the version including also individual linear trends. As already noted, rejection of the null is to be interpreted as evidence that per-capita income converges across countries in a RIA. The GDP data used for the test are in constant prices and adjusted for PPPs[3].

Results appear to be sensitive to the inclusion of individual linear trends. Still, a general message holds independently from the specification of the AR equation: per-capita income convergence is not necessarily a prerogative of North-North integration. The null hypothesis is for instance always rejected for CACM, CARICOM, CBI, CEFTA and MERCOSUR. These are RIAs that include developing,

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[2] The following countries are not included because of lack of data : Antigua and Barbados and Montserrat in CARICOM ; Liechtenstein in EEA ; Brunei in APEC1 and APEC2 ; Liberia in ECOWAS ; Eritrea, Djibouti and Sudan in COMESA1 and COMESA2 ; Swaziland in COMESA1, SADC1 and SACU ; Buthan and Maldives in SAPTA, Lybia in UMA ; Turkmenistan in the CIS.

[3] The primary source of the data are the Penn World Tables (Heston et al. 2002). The series are updated using the data from the World Economic Outlook , September 2004, of the IMF as outlined in Gulde and Schulze-Ghattas (1993).

or at best emerging, economies and which can therefore be characterized as cases of South-South integration. It is also worth noting that the classical example of North-North integration, the EU, does not lead to systematic per-capita income convergence according to the panel unit-root test[4].

Yet, the optimistic picture on the convergence properties of South-South integration needs to be qualified. In some cases, in fact, cross-country convergence appears to be taking place around a relatively flat regional growth trend. That is, whilst countries in some South-South RIAs do converge towards the regional average, this regional average fails to catch-up with industrial countries' income. This is for instance observed in CACM, CBI and MERCOSUR[5]. Conversely, there are RIAs whose average income is catching-up with industrial economies, but member-states fail to converge to the regional mean (i.e. ASEAN, CIS, EAEC, SACU, SADC2).

The conclusion of this empirical analysis is thus that South-South integration does not necessarily imply widening intra-regional disparities; however it might lead to a form of convergence to the bottom. The extent to which institutional characteristics of a RIA (i.e. its degree of openness towards the rest of the world, its composition in terms

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[4] Applying the Levin et al. (2002) panel unit root test results in a larger number of RIAs for which evidence of convergence is detected. Particularly, the null of a unit root is rejected for several African RIAs, where however cross-country heterogeneity is a problem. Ben David's (1996) version of the test results instead in a less frequent rejection of the null of a unit root. Still, the null is rejected for all of the RIAs for which the Im et al. (2003) test also leads to rejection under both versions.

[5] In proportion to US income, average income in CACM drops from 78.9 percent to 77.9 percent between 1993 and 2004, in CBI average income drops from 73 percent to 71.7 percent between 1992 and 2004, in MERCOSUR average income drops from 86.5 percent to 85.3 percent between 1991 and 2004.

of number of countries and their initial degree of heterogeneity, the depth of the economic integration process it aims at) determine both the tendency of member countries to converge towards the regional average and the tendency of the average to catch-up with industrial economies is certainly an avenue of interesting future research.

Regional integration Agreements, membership covered by the test, and sample period	Version 1	Version 2
ANDEAN (Bolivia, Colombia, Ecuador, Peru, Venezuela), 1991-2004	0.095	-0.465
APEC 1 (Australia, Canada, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, US, China, Hong Kong, Taiwan), 1991-2004	-1.422*	-0.190
APEC 2 (Apec 1 plus Mexico, Papua New Guinea, Chile), 1993-2004	-1.916**	0.690
ASEAN (Indonesia, Malaysia, Philippines, Singapore, Thailand) 1977-2004	0.500	1.834
CACM (El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica), 1993-2004	-2.689***	-1.526*
CARICOM (Barbados, Jamaica, St. Kitts and Nevis, Trinidad and Tobago, Belize, Dominica, Grenada, St. Lucia, St. Vincent), 1980-2004	-1.764**	-1.883**
CBI (Burundi, Comoros, Kenya, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe), 1992-2004	-2.179**	-4.398***
CEFTA (Czech Republic, Hungary, Poland, Slovak Republic, Slovenia), 1993-2004	-1.230*	-1.648**
CEMAC (Cameroon, Central Africa Republic, Chad, Republic of Congo, Equatorial Guinea, Gabon), 1964-2004	0.386	2.845
CIS (Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Kazakhstan, Moldova, Tajikistan, Uzbekistan, Belarus, Russia, Ukraine), 1994-2004	-0.225	-0.615
COMESA 1 (Angola, Burundi, Comoros Islands, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Malawi, Madagascar, Mauritius, Namibia, Rwanda, Seychelles, Uganda, Zambia, Zimbabwe), 1982-2004	1.426	1.568
COMESA 2 (Comesa 1 plus Swaziland), 1993-2004	-0.801	-3.455***
EAEC (Russia, Kyrgyz Republic, Belarus, Kazakhstan, Tajikistan), 1994-2004	0.322	0.406
ECOWAS (Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo), 1975-2004	1.534	-1.833**
EEA (EU 3 plus Iceland, Norway), 1994-2004	-0.012	0.821
EU 1 (Belgium, France, Germany, Italy, Luxembourg, Netherlands, Denmark, Ireland, UK, Greece), 1981-2004	5.760	1.890
EU 2 (EU2 plus Portugal, Spain), 1986-2004	0.794	-0.201
EU 3 (EU2 plus Austria, Finland and Sweden), 1994-2004	-1.783**	-0.292
LAIA (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela), 1980-2004	-0.706	0.366
MERCOSUR (Argentina, Brazil, Paraguay, Uruguay), 1991-2004	-1.876**	-1.724**
NAFTA 1 (Canada, US), 1989-2004	-3.306***	-1.398*
NAFTA 2 (Nafta 1 plus Mexico), 1994-2004	-3.387***	-2.017**
SACU (Botswana, Lesotho, Namibia, South Africa, Swaziland), 1960-2004	1.913	-2.294***
SADC 1 (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, Zimbabwe), 1980-1993	-1.925**	-0.658
SADC 2 (Sadc 1 plus South Africa), 1994-2004	0.217	-2.261**
SAPTA (Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka), 1995-2004	-0.599	0.783
UEMOA (Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo), 1973-2004	0.947	-1.427*
UMA (Algeria, Mauritania, Morocco, Tunisia), 1989-2004	-1.113	-2-231**

Note : For each regional initiative, the table reports the list of member countries included in the econometric test and the sample period of the test. Test-statistics are reported for two versions of the test. In version 1, the AR equation includes individual effects. In. version 2 the AR equation includes individual effects and linear trends. The selection of lags in the AR equation is based on the Schwarz Information Criterion. *, **, *** denotes rejection of the null hypothesis at 10%, 5%, 1% confidence level respectively.

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