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Composite Indexes and Systems of Indicators of Regional Integration.

Gaspare M Genna
Philippe DeLombaerde, *United Nations University*
Ettore Dorrucci
Francesco Paolo P Mongelli

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Edited by Philippe De Lombaerde,
Renato G. Flôres Jr., P. Lelio Iapadre
and Michael Schulz

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Philippe De Lombaerde,
Ettore Dorrucci, Gaspare Genna
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Introduction

This chapter reviews and classifies a set of measures to describe, compare and assess different processes of regional integration – e.g. among a group of neighbouring states, or states that have historical or cultural ties, or other links of any other nature – in their various dimensions. We do not refer to groupings of geographic entities within countries (e.g. German Länder or United States (US)). As an example, the term 'region' can be applied to the European Union (EU) or Common Market of the South (MERCOSUR) or Association of Southeast Asian Nations (ASEAN), to name just a few among those discussed in this chapter. Thus, regional integration is opposed to autarchy and isolation. On the other hand, there are diverse types and scopes of regional integration – as well as stages of implementation – that we encounter in this chapter. Moreover, the motivation for undertaking regional integration – i.e. the overarching aim(s) and specific objectives – is fundamental for judging both its status of implementation and perspective. Groups of states can launch a process of regional integration to improve their political links, to reap the gains from trade in goods and services, to strengthen financial links and benefit from risk sharing and better investment opportunities, or a mix of these objectives and more. The motivation of regional integration is beyond the scope of this chapter, i.e. the measures and indices of regional integration discussed here will in any case provide only some selected snapshots. Another aspect that is difficult to capture by means of the measures and indices below is the net benefits from regional integration. Presumably lasting integration schemes are those that fulfil the original aim(s) and objective(s) and whose diverse benefits exceed the various costs.

Simple, uni-dimensional measures can at best monitor and highlight specific aspects and features of the regional integration process at a given point in time or as they develop over time. Regional integration, however, is a much more complex and multi-dimensional processes of change, including:

- actors associated with the (sub)national level(s) of governance, who increasingly interact at the (supranational) regional level;
- their behaviours and policies, which are increasingly coordinated or unified at the regional level; and/or
- the development of regional institutions.

In this chapter we will, therefore, introduce a distinction between 'indicators' that measure a particular variable, 'systems of indicators' and 'composite indices' (the latter providing an aggregated measure of two or more indicators), which describe more complex phenomena or institutions.[1] We focus here on systems of indicators and composite indices, but specific indicators – providing the building blocks of such systems and indices – are not systematically discussed in this chapter (see instead the other chapters included in this volume).

Our aim is to progress in terms of acceptance of a coherent system of indicators and indices to monitor regional integration. This is not a small goal if we consider that there are now around 200 sovereign countries that are recognised by the United Nations, but more than 250 relevant international arrangements dealing with various forms of economic, financial and/or monetary integration. Using the analogy of the 'spaghetti bowl', we feel that we are instead faced with a bowl filled with many and diverse types of noodles: we intend to sort some order in such a 'pasta bowl'. We see the composite indices and systems of indicators we present here as a crucial step in an analytical process to identify causes and effects of regional integration. They could also support the analysis of theoretical models or frameworks of regional integration. Theoretical models include a set of independent variables that are expected to *explain* the dependent variable 'regional integration', which in turn can also be used as independent variable to explain other variables.

The first section of this chapter provides general criteria on the design of a system of indicators. Section two addresses the construction of composite indices as summary measures drawn from a system of indicators. The third section reviews a selection of specific proposals to construct composite indices, applied to different world regions. Finally, the last section concludes.

Building systems of indicators of regional integration

Selection principles

We argue/show that building indicators of regional integration bears some resemblances to 'building' of any other type of indicators and yet also displays some important differences.

The selection of indicators of regional integration, as any other type of indicators, should be based on a number of general principles which are often neglected or not given sufficient attention. A summary is provided below.[2]

Relevance

Indicators should have a clear purpose and inform the user about the phenomenon in which he/she is interested. Conceptual clarity is therefore a *conditio sine qua non* for a good selection of indicators. In the context of a system of indicators or for the purpose of constructing composite indices, relevance should not be evaluated for each indicator individually; rather, the selection of each indicator should take due account of the final objective(s) of the analysis. Adding new indicators should not affect the balance of the system. As further discussed below, in the case of regional integration it is important to distinguish between the 'formalisation of the process' and the actual degree of regional integration or interdependence. Formal indicators do not necessarily inform us about the actual implementation of regional integration, and vice versa. There is indeed a lag between the moment when treaties are signed and when they enter into force, and there is also a gap between treaty provisions and their actual implementation. This must be taken into consideration by those researchers who construct integration measures from coding treaties. False starts stemming from, e.g. coordination problems, unforeseen domestic crises or wishful thinking are very frequent. Finally, variables focusing on national governance issues, while being frequently used in the literature on regional integration, do not necessarily inform us about the regional integration process.[3]

Accuracy and credibility

Similar measures and indicators should have identical, or at least very similar, meaning across regions and specific processes of regional integration. In particular, the credibility of the data source can be used as a proxy for accuracy. In various regions, regional bodies are increasingly promoting the harmonisation of statistical methods and quality standards among their members. For example, Gulf Cooperation Council (GCC) countries are currently on the path of harmonising data gathering methods for the pursuit of a common currency. In addition to EUROSTAT, the Andean Community and Economic Community of West African States (ECOWAS) have also engaged in efforts to improve regional statistical capacity.

Data availability

In order to actually implement a system of indicators or to calculate composite indices, the ease with which original data can be accessed is also crucial. This is often the main hurdle in comparative studies of regional integration. The range of available data is limited especially, but not exclusively, for Least Developed Countries (LDCs). This is one reason why many researchers work with score-based metrics that rely on treaties and expert assessments. Indicator systems on regional integration crucially require

data on intra-regional interdependence that usually are not systematically available.[4]

Timeliness

This principle refers to the minimisation of the lag between the publication of data and the realisation of the latest events they describe or measure. In the case of systems of indicators and composite indices, the overall quality of the system or index will depend on the least timely components in the system.

Classification of variables and indicators and conceptual frameworks

The variables and indicators describing particular aspects of regional integration processes can be grouped into several categories, each one corresponding to a broad aspect or dimension of the phenomenon 'regional integration'. This process of classification provides a structure of indicator systems and composite indices that reflects the conceptual and theoretical framework of the analyst. Conceptual frameworks can:

- be broad or narrow in terms of actors considered, policy areas covered, etc.;
- reflect different theoretical models of regional integration: functionalist model, optimum currency area theory, fiscal federalism, transactionalism, liberal intergovernmentalism, two-level games analysis, etc.;
- reveal biases of different sorts (disciplinary, ideological, geographical, etc.).

Generally speaking, variables and indicators can be classified by varying degrees of sophistication:

- *policy areas*, including, for example, economic policy, social policy, migration, agriculture, foreign and defence policy, or peacekeeping[5];
- *disciplinary approaches*, such as political science, international relations, economics and finance, and/or geography;
- their *logical or functional place within a system or process of regional integration*, that is a more sophisticated type of classification than the previous ones. On the other hand such logical or functional variables and indicators may significantly increase the analytical value added of the system of indicators. In the process of regional integration one could, for example, distinguish between inputs, outputs and process indicators (Dennis and Yusof 2003: 20, De Lombaerde and Van Langenhove 2005: 21). The difficulties that then arise are related to the contents of the input category (exogenous versus endogenous/policy variables), the contents of the output category (intermediate versus final output, direct versus indirect

policy effects, etc.) and the causal interpretation of the links between the variables, which might be problematic in a systemic context.

Another important distinction, often used when constructing indicator systems for monitoring regional integration processes, is the one between:

- indicators describing the integration process from an *institutional perspective*, (as for example a decision to establish a free trade zone); and
- indicators examining the *actual advancements in a specific* process of regional integration (as, for example, the actual implementation of all the laws and regulations to implement the free trade zone).[6]

In an inter-governmental context, indicators of institutional integration measure the policy decisions taken and/or implemented by two or more governments of countries belonging to the same geographic area in order to promote cooperation in different possible spheres such as, for instance, economic, security or foreign policy issues. Such cooperation consists of the deepening and/or widening of the spheres of coordination under the terms of an agreed pact, which defines a set of procedures and institutions. Pacts may vary widely in form, ranging from inter-governmental agreements on sectoral cooperation to economic and monetary unions with transfer of sovereignty to supranational institutions. In a more general context, institutional integration can also refer to other actors and instances of regional governance.

Conversely, the indicators of actual regional integration measure the degree of interaction of activities and interdependence among two or more countries belonging to the same geographic area as measured at a given point in time. Interaction and interdependence can of course take place also between different areas (in this case the adjective 'inter-regional' is often used). Economic activity includes here real aspects of an economy (such as trade and labour mobility), financial/monetary aspects (such as financial flows and interest rate differentials) and policy-related aspects (such as budget deficits or tax rate differentials).

Assessing regional integration from both the institutional and the actual perspective presents diverse advantages. First, it helps understanding the *different nature and features* of integration in different regions. Different combinations of institutional and actual regional integration can indeed be found in different regions. According to Dorrucci *et al.* (2002, 2004), for example, whereas the EU presents high scores for both aspects, East Asia exhibits high actual regional economic integration despite low institutional integration. This helps understand that, differently from Europe, the engine of regional economic integration in East Asia was not given by joint policy decisions taken by governments, but rather by other factors, such as the market-driven need to develop a regional production chain to integrate in the global economy. The various Latin American regional arrangements in

turn would illustrate the paradox of a relatively high degree of institutional integration but very low degrees of actual economic integration.

A second advantage of developing measures of institutional versus actual integration is that this is a necessary step towards a better knowledge of the *interaction* between the policy decisions taken to enhance integration and the actual degree of integration. This is an important development in the literature on regional economic integration. For example, in their seminal contributions on the endogeneity of optimum currency areas (OCAs), Frankel and Rose (1997, 2000) measured *actual economic integration* (AEI) from the moment when a monetary union starts, but they did not focus on two key aspects, namely that: (i) there is a whole dynamic institutional process leading to the establishment of a monetary union, a process that can last decades and needs to be measured; (ii) during such a process, AEI and *institutional economic integration* (IEI) may well interact (i.e. AEI is not necessarily endogenous to IEI, but may in turn stimulate IEI further).

A third advantage is that this distinction provides for a framework to evaluate the performance of regional institutions and policies. This would answer important questions related to the efficiency of regional institutions in producing desired goals. Related questions involve the capabilities of states to coordinate efforts and/or implement joint policies when regional institutions are weak.

In the economic literature, institutional integration is further disaggregated into 'negative' and 'positive' functional types of integration (Tinbergen 1954). These concepts, however, can easily be applied to other policy domains. In its original formulation, negative integration refers to the removal of barriers to the circulation of goods, services, workers and capital. Such barriers range from tariffs and quotas to other, less visible, types of obstacles. Positive integration refers to the coordination, or even implementation at a supranational level, of a number of micro-economic and macro-economic policies, and to the ensuing the creation of supranational institutions.

Regarding a process of economic integration, a helpful, and widely accepted, classification of the various functional degrees of institutional integration was provided by Balassa (1961), who indicated five main stages of institutional integration (see Box 14.1).

Box 14.1 Five main stages of regional institutional integration

Stage 1: Free Trade Area (FTA) – An area where tariffs and quotas are abolished for imports from area members, which, however, retain national tariffs and quotas against third countries. Examples are ASEAN Free Trade Area (AFTA) and the North American Free Trade Agreement (NAFTA);

Stage 2: Customs Union (CU) – A FTA setting up common tariffs and quotas (if any) for trade with non-members. An example is the European Economic Community since 1968;

Stage 3: Common Market (CM) – A CU abolishing non-tariff barriers to trade (i.e. promoting the integration of product and service markets) as well as restrictions on factor movement (i.e. promoting the integration of capital and labour markets). Examples are the Andean Community and the European Community since 1993 (with the establishment of the European Single Market). The CM was already set up as an objective under the Treaty of Rome (so-called 'four freedoms');

Stage 4: Economic Union (EUN) – A CM with a significant degree of coordination of national economic policies and/or harmonisation of relevant domestic laws. An example is the European Union nowadays;

Stage 5: Total Economic Integration – An economic union with all relevant economic policies conducted at the supranational level, possibly in compliance with the principle of subsidiarity. To this aim, both supranational authorities and supranational laws need to be in place. An example is the euro area (comprising, from 2008 onwards, 15 out of 27 EU members), which can be currently classified somewhere between an economic union and total economic integration. However, some supranational authorities and joint rule making were established already with the Treaty of Rome in 1957, and subsequently enhanced.

More than 50 years after the launch of regional integration in Europe – and taking also into account the more recent, but lively experience of other regional arrangements – one can identify some conceptual limitations in the Balassa approach.

First, *regional* institutional economic integration should be seen as part of a *broader* spectrum of policies designed to enhance the economic integration of one country with one or more other countries. Such policies, which can be named Integration Arrangements (IAs), may or may not be regional in nature since they may be[7]:

- multilateral (e.g. WTO-based Doha Round of multilateral trade negotiations);
- inter-regional (e.g. Asia-Pacific Economic Cooperation (APEC), Asia-Europe Meeting (ASEM), Yaoundé/Lomé Conventions between the EU and the African, Caribbean and Pacific countries (ACP) countries);
- regional (e.g. NAFTA, EU, MERCOSUR, ASEAN, GCC), which is the

focus of this book;
- bilateral outside a given region (e.g. Chile's agreements with partners outside the Western hemisphere).

Second, besides the above-discussed choice of partners – i.e. the scope of international arrangements or their 'horizontal dimension', which can be broader than usually postulated under a purely regional approach – there is also a 'vertical dimension' of the arrangements, which pertains to their depth, defined as the final economic objectives being pursued. According to the classification proposed by Balassa, such final objectives are comprised in a wide spectrum ranging from free trade arrangements to full unification of the economic policies (Box 14.1). Each country or regional arrangement is therefore confronted, at any given point in time, with a menu of options pertaining to the scope and depth of international arrangements. Experience shows, however, that options are not necessarily mutually inconsistent, i.e. that *several options may be adopted at the same time.* For instance, the EU is regional in nature, but is also involved in multilateral, inter-regional, bilateral and even sub-regional (e.g. Schengen, Economic and Monetary Union) arrangements, each presenting a different level of depth. There is, therefore, no one-size-fits-all approach to international arrangements, differently from what the Balassa approach may suggest. Rather, different factors may lead to different scope/depth combinations for different countries. As a result, any attempt to measure IEI will necessarily lead to some simplifications regarding both its horizontal and its vertical dimension, to be kept in mind as a caveat.

Third, the five 'stages' of integration referred to in Box 14.1 suggest a clear *sequencing* of economic integration, from purely trade, through free movement of the factors of production, to the establishment of supranational organisations, laws and policies. This sequencing can be identified in the European experience – though some aspects of total economic integration, such as supranational institutions, were already present at the beginning of the process of institutional integration – but contrasts with the 'menu approach' that currently characterises several experiences outside the EU.

Fourth, an additional element of complexity is that an optimal sequencing of IEI should not only be depicted by the five stages of integration, but also *within* each of them. For example, with respect to the liberalisation of factor mobility in the creation of a common market, experience has taught that reform of the financial sector, particularly banking, should be a prerequisite for the removal of capital controls, and that the strengthening of regulation and institutional capacity should precede financial sector reform.[8]

Bearing in mind these caveats and overarching questions about the usefulness of developing an indicator of IEI and its adaptability to regions other than the EU, the five Balassa stages remain a key classification starting from which an index of institutional integration can be developed.

Most conceptual frameworks have an economic focus because of the economy-driven nature of many arrangements. Nonetheless, the focus may also be on other aspects, such as security communities. Deutsch *et al.* (1957) defined such communities as states committing themselves to resolve disputes in peaceful ways. Security communities, they observed, can be either pluralistic or amalgamated. A pluralistic community fully retains state sovereignty and is, therefore, intergovernmental in nature. It is held together by a set of core values (common identity, loyalty) and some common institutions. An amalgamated community includes merged units and is governed by a 'supreme decision-making centre'. Both pluralistic and amalgamated communities are readily measurable.

Adler and Barnett (2006) start from the Deutsch *et al.* description and expand it to also explicitly include security relations *external* to the community. They do so when laying out three broad phases of a security community development:

- In the nascent phase, states do not explicitly seek out the development of a security community but recognise the need for mutual security. To foster this need in an environment lacking mutual trust, states establish institutions needed to overcome collective action problems. The establishment of such institutions becomes the key indicator of the nascent phase;
- In the ascendant phase, institutions are developed to manage increasing military coordination and cooperation. This phase also includes the decreasing belief that security threats exist among member states, and occurs in an environment of 'increasingly dense networks' aiming to a collective identity. Indicators include military procurement from firms across the member states, sharing of intelligence and the dismantling of institutions needed to monitor cooperation;
- In the final or mature phase, a single identity and a community governance system are shared. Indicators include intergovernmental or supranational decision-making mechanisms for foreign and defence policy, the lack of border checkpoints, military planning, integrated arms, a common belief of what defines an external and internal threat and common norms regarding foreign policy.

Current examples include the EU and ECOWAS. In brief, the EU efforts include the development of a common foreign and defence policy. The implementation of the Lisbon Treaty established the office of the 'High Representative of the Union for Foreign Affairs and Security Policy' and a diplomatic corps for the Union. Militarily, the European Defence Agency supports EU operations. Also, five EU members have established the Eurocorps, a multinational army corps that works within the common defence framework of the Western European Union. The ECOWAS Monitoring Group (ECOMOG) established a coordinated effort among member-state military battalions under a single command structure. The aim is to create

regional security in an area of the world that is strife with unstable regimes, democratic breakdown and civil war. The first use of ECOMOG was the intervention in the Liberian civil war.

Specific methodological issues, challenges and problems

When developing systems of indicators of regional integration, certain distinctive challenges arise. The first one relates to the issue of 'fixed effects'. Each country and region has specific characteristics that may have unique consequences. Therefore, developing a universal measure of integration across regions may be problematic. The best solution for this is the application of fixed-effects models when performing econometric estimations. By including regional dummy variables, one can control for bias in the measurement.

The second challenge is the level of assessment. When we attempt to measure the degree to which two or more countries are integrated, we assume a uniform level of integration across these countries. If the countries are small, then the problem is not large. However if the countries are large the assumption can be problematic, given the hypothesis in question. For example, border areas could very well be more integrated than the countries' centres or outer peripheries. Therefore, attempting to use measurements of aggregate integration to test hypotheses regarding integration of specific localities, such as border cities, can produce incorrect conclusions. The only solution is to examine the validity of the measurement for the stated purposes and not mix levels of assessments.

Overlapping memberships are problematic because the level of integration may not be uniform across the regional case. If the unit of analysis is the region, we assume that all countries have at least the legal and political ability to integrate at the same rate. But if two or more countries are members of other regional groupings and if these groupings vary in the level of integration, then what the researcher is actually trying to explain becomes unclear. If overlapping membership is perfect across two or more regional groupings, then this is not a problem. The problem may not be serious if the number of overlapping memberships is small. The same problem carries over when the unit of analysis is dyadic because it is uncertain if the level of integration observed is due to being associated with regional grouping A or B. This problem may be remedied if we can accept the following assumption: the level of integration will more likely be higher in a treaty environment that allows more integration. This also assumes treaty implementation, but verification of this is relatively simple. By making this assumption, then the score for the deeper integration treaty should be used.

Another significant issue is that of a possible Eurocentric bias (in terms of tools and conceptual framework). The EU is the deepest form of integration among states. As a result, many coding scales and indices follow the European example, and yet may fundamentally differ from it. As a result, the measurement may not be objective. As previously stated, for instance, the

EU basically adopted a Balassa (1961) framework. Hence, if the researcher uses this framework in the analysis of the EU, then the analysis will not be significantly biased. But problems can be identified if the case in point is a regional arrangement following a menu approach.

Related to the issue of Eurocentrism is the issue of benchmarks. Referring to the European case can be relevant for some purposes, but for other purposes it might not be the case. Alternative benchmarks, not depending on a specific external case, might be preferable. United Nations Economic Commission for Africa (UNECA) (2002), for example, proposed the use of two such alternative benchmarks: (i) continental averages of the n best performers; and (ii) the self-defined goals of the regional arrangements.

Another problem is what to do when regional organisations transform over time. Take the EU, for example. Do the Coal and Steel Community, the European Economic Community, the European Community and the EU represent one continuous case or several distinct arrangements? The average scholar would agree that this is one case that has evolved over time, thus requiring name changes. However, what about arrangements that temporarily collapse but then are reinstated by the same member states, such as the East African Community or the Central American Integration System? Do such examples represent two cases or one? Also, what if the transformation of the organisation is not driven by its deepening (as in the case of the EU), but by dysfunctional operation as in the case of the Organisation of African States (OAS) becoming the African Union (AU)? Many would argue that the OAS and the AU do not represent a deepening of integration that warrants being treated as a single case. Even though the solution to this type of problems may be research-specific, a solid explanation grounded in the theory would be necessary.

Composite regional integration indices

Many integration measures rely on developing one index out of multiple indicators. The logic behind this is simple: regional integration is a complex, multidimensional phenomenon. To capture the complexity and not bias results by focusing on one or a few aspects, it becomes necessary to breakdown the concept, measure its components, and then aggregate them in some fashion. The researcher then has a summary indicator that can be tracked across time and space. Such a summary measure can then also be used as a (dependent or independent) variable in econometric work to test hypotheses related to the causes and consequences of regional integration.[9]

There are many ways to construct composite indices. Although it is unavoidable that the construction involves important portions of judgement by the researcher and some degree of arbitrariness, it is possible to give some indications of what constitutes 'good' practice in this field. A good benchmark for assuring 'good' practice in the construction of composite indicators is the stepwise approach proposed by Nardo *et al.* (2005) (Box 14.2).

Box 14.2 Steps in the construction of composite indicators

Step 1   Development of a theoretical framework
Step 2   Data selection
Step 3   Exploratory multivariate analysis
Step 4   Imputation of missing data (if applicable)
Step 5   Normalisation of indicators
Step 6   Weighting and aggregation of indicators
Step 7   Analysis of robustness and sensitivity of composite indicator
Step 8   Linkage with other variables/indicators
Step 9   Visualisation of results
Step 10   Linkage (back) to components, sub-indicators and individual variables

Source: Based on Nardo *et al.* (2005: 9–10).

Steps 1 and 2 have already been covered in the first section of this chapter. In this section we will concentrate on the following important steps in the construction of composite indicators: normalisation; weighting and aggregation; and robustness tests.

Normalisation process

Aggregating varying measurement ranges would bring about the introduction of unintended weights. For example, if an additive index is developed from three components, A, B, and C, and the range of each component is different (A ranges between 1 and 3, B between 0 and 5, and C between 1 and 10), then the multivariate analysis will more likely explain the variation in C rather than the overall index, since C has the largest range and thereby the largest impact on the overall index range. The components would need to be re-scaled so that the ranges are identical and results are not unintentionally biased in favour of one or more components. Different technical options are available for this purpose (OECD 2003b; Nardo *et al.* 2005). The most used are probably:

- ranking of countries or regions for each individual indicator;
- assignment of (qualitative or quantitative) categorical scales for each indicator;
- re-scaling of indicators in order to obtain identical ranges (e.g. 0–100);
- standardisation of indicators in order to obtain common scales with mean zero and standard deviation one;
- transformation of each indicator into a relative distance from a benchmark value; and

- transformation of each indicator into a (percentage, annual) difference over time.[10]

Weighting and aggregation

Although applying equal weights is probably the easiest and most used weighting procedure, in certain cases it may become necessary to include index components at different weights. This would occur when the underlying concept of integration is defined in such a way that particular components have more value than others. Components may still need to be normalised so that the researcher can maximise control over the amount of weight given to any one component. Subjectively, a researcher can give greater importance to certain items based on expert opinions of integration in a geographic or substantive area, or because of theoretical considerations. If the index aims to measure e.g. the level of societal integration, the level of transnational communication would have greater substantive importance than the exchange of goods and services. If security communities are of interest, then mechanisms of foreign policy coordination and military asset sharing would have greater value than labour mobility. Expert opinions on weights can be gathered in different ways. These include the budget allocation approach, the analytic hierarchy process, and conjoint analysis.[11] Usually, weights are defined at two (or more) levels: weights are defined for the different dimensions of the composite indicator (i.e. for subsets of individual indicators), and they are defined for individual indicators within these subsets.

In the case of statistical weighting procedures, multivariate statistical methods (like factor analysis or principal components analysis) are used to derive the weights mechanically. Statistical weighting maximises the information content (read: variation) in the individual indicators and/or minimises the number of variables capable of representing the different statistical dimensions of the measured multidimensional phenomenon.[12] In any case, it should be clear that both statistical and non-statistical weighting procedures depend on value judgements of the builders (and users) of the composite indicator, based on theoretical and conceptual considerations, the purpose and use of the indicator and technical and practical considerations. No one-size-fits-all solution exists, and each method has advantages and disadvantages.

Once the indicators and indicator categories are weighted, these can be aggregated in order to obtain the composite indicator of regional integration. Aggregation can be linear or geometric.

Robustness and sensitivity tests

As explained before, the construction of a composite indicator of regional integration is thus a complex process in which many choices have to be made by the analyst and which are, in addition, often imposed by data constraints

or lack of information. The main sources of uncertainty are: the choice of sub-indicators, the existence of erratic data, the use of a particular editing scheme for data imputation and the choice of normalisation, weighting and aggregation procedures (Nardo *et al.* 2005: 23–24). The potential impact of each source of uncertainty on the values of the composite indicator depends on the structure of the latter. The more complex this structure, the more difficult to link uncertainty to potential impact on composite indicator values or regional rankings.

Sensitivity analysis can help in assessing these mechanisms, not only in the construction phase of the composite indicator, but also when communicating results ex post. Sensitivity analysis makes the potential impact of a variation in one (uncertain) component (be it substantial or procedural) on the value of the composite indicator or on the resulting regional rankings explicit. This is usually done by showing uncertainty bounds for values or rankings and can be visualised with scatter-plots. One could, for example, show the incidence of adding (or omitting) a particular sub-indicator, replacing one data source by another, changing weights, etc.

Review of applications

To our knowledge, only a few attempts have been undertaken to design and construct composite indices of regional integration, and no proposal has been systematically and continuously used as a policy tool. In the following paragraphs we will review five relevant (recent) proposals: Hufbauer and Schott (1994) and related work; Dorrucci *et al.* (2002) and related work; UNECA (2002); UN-ESCWA (2007); and Dennis and Yusof (2003).[13]

Hufbauer and Schott

Hufbauer and Schott (1994) present a proposal to assess the pre-conditions for (further) regional (hemispheric) integration in the Americas, taking into account the complexity of the process related to the vast differences between the countries of North and South America. The authors distinguish between two sets of indicators. A first set assesses the level of economic integration achieved by each sub-regional group. A second set examines the level of 'readiness' of these groups to increase the degree of hemispheric integration. With the first set of indicators composite 'achievement scores on economic integration' are calculated for five sub-regional arrangements and one benchmark case (EU). The authors' point of departure is a conceptual framework inspired by Balassa (1961) and the European experience. They themselves score these arrangements on six aspects of economic integration: (i) free trade in goods and services; (ii) free movement of capital; (iii) free movement of labour; (iv) supra-regional institutions; (v) monetary coordination; and (vi) fiscal coordination. The scores reflect both quantitative and qualitative aspects of the integration process. The weighting and

aggregation procedure is based on equally weighted arithmetic averages. In parallel, readiness indicators are calculated, based on scores for each country within a sub-regional arrangement for seven indicators (on a 0–5 scale): price stability, budget discipline, external debt, currency stability, market-oriented policies, reliance on trade taxes and functioning democracy. Again, a combination of quantitative and qualitative aspects explains the scores, and simple arithmetic averages are computed to obtain the composite indicators for the regional groupings. The readiness indicators thus only reflect macro-economic and (to a lesser extent) political conditions in member states.

Feng and Genna (2003, 2004, 2005) present a modified version of Hufbauer and Schott's Achievement score and apply it to regional integration processes in the Americas (NAFTA, Andean Community, Central American Common Market (CACM), MERCOSUR), Europe (EU), and Asia-Pacific (APEC, ASEAN, Eurasian Economic Community (EAEC), Australia New Zealand Closer Economic Relations Trade Agreement (ANZCERTA)), using data for an expanded time frame (from the year of creation of the regional scheme until 1998). Values are assigned based on evidenced implementation of agreements rather than treaty signature or ratification dates. They measure the level of regional integration according to the same six categories but use a five-level Gutman scale within each category. The integration achievement score is used mainly to test the hypothesis that 'a critical condition for the emergence of a successful economic union is that the homogenisation of domestic economic institutions and the process of regional integration reinforce each other'. The weighting and aggregation
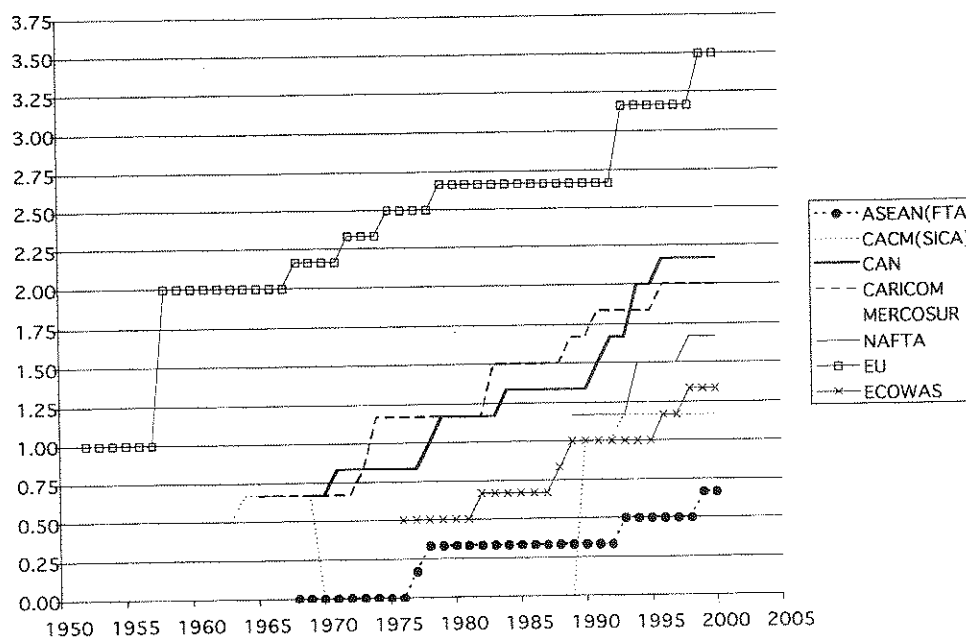

Figure 14.1 Plots of integration achievement score for various regional arrangements.

procedures are also based on simple arithmetic averages. The general conclusions of these papers are that successful integration develops when domestic homogenisation and deepening integration follow each other in a synchronous time frame. For example, homogenisation and deepening occurs in three year cycles for the EU. However, the cycle from deepening to homogenisation takes two years and from homogenisation to deepening takes three years for ASEAN. Figure 14.1 provides a plotting of integration achievement scores for various regional arrangements.

Dorucci et al.

The contributions of Dorrucci *et al.* (2002, 2004) and Mongelli *et al.* (2007) move forward from the Balassa (1961) framework that is summarised in Box 14.1. Initially, the authors develop an index of institutional economic integration (IEI) based on the measurement of Balassa's 'five stages'. The overall degree of institutional integration achieved within a regional arrangement at a given point in time is quantified by assigning numbers ('scores') to the level of integration recorded, for each of these five stages, throughout the relevant period (e.g. 1957 onwards for the EU, 2001 onwards for MERCOSUR, etc.). This allows *measuring*, and therefore comparing, those regional arrangements in the world that broadly evolve along the Balassa lines in a relatively homogeneous way, although with some unavoidable degree of discretion and judgement. The authors assign scores from 0 to 25 to the degree of regional integration achieved over time in the development of, respectively:

- a Free Trade Area/Customs Union (FTA/CU, considered jointly) (measured by the changes over time of tariffs and quotas on trade, and in the case of the EU the implementation of the Common Agricultural Policy – CAP);
- a Common Market (CM) (measured by the progress in abolishing non-tariff barriers, and the liberalisation of the movement of capital and workers);
- an Economic Union (EUN) (measured by the degree of coordination of national macro-economic and micro-economic policies); and
- an area with Total Economic Integration (TEI) (measured by the set-up of supranational institutions and decision-making processes, as well as the structuring of the process of regional integration through laws issued and enforced at the supranational level, and the conduction of macro-economic policies at the regional level).

By summing up the scores achieved in each moment in time (monthly data are used), an index of institutional regional integration is obtained which can range between 0 (no economic integration at all) and 100 (full economic integration, including monetary and financial integration). Scores

are assigned on the basis of the indicators mentioned above. To the extent possible, the authors do not assign scores on the basis of the year when a certain decision was taken (e.g. Treaty of Rome in 1957), but rather on the basis of the year and month when such a decision started being actually *implemented* (e.g. lowering of EU-6 internal tariffs between 1959 and 1968). This implies that those projects which were never implemented (e.g. Werner Plan) are not taken into account. Moreover, the authors take into account that, e.g. in the European experience, some Balassa stages tend to develop *in parallel*, which implies that in this case the term 'stage' could be misleading. This entails that numbers can be assigned *in parallel* to each of the five stages. Figures 14.2 and 14.3 report the index of institutional integration for, respectively, the six founding members of the EU and EU-15 compared with all regional arrangements in East Asia and Latin America.

Independently from the IEI index, the authors measure AEI with a set of indicators. The underlying theoretical framework is inspired by OCA theory. The variables captured by the indicators include: synchronisation of the business cycle, convergence of inflation rates, exchange rate variability, trade openness and integration, financial market integration, convergence of interest rates and income convergence.[14]

After having developed the measures of actual economic integration (AEI) and having constructed a composite index, the authors measure the interaction between the IEI index and the AEI index via a cluster analysis (Dorrucci *et al.* 2002) and a Vector-Auto Regression (VAR) analysis (Dorrucci *et al.* 2004). The analysis leads to the general conclusion that IEI and AEI have been strongly interacting over time in the EU case, with the direction of causality going in both directions.
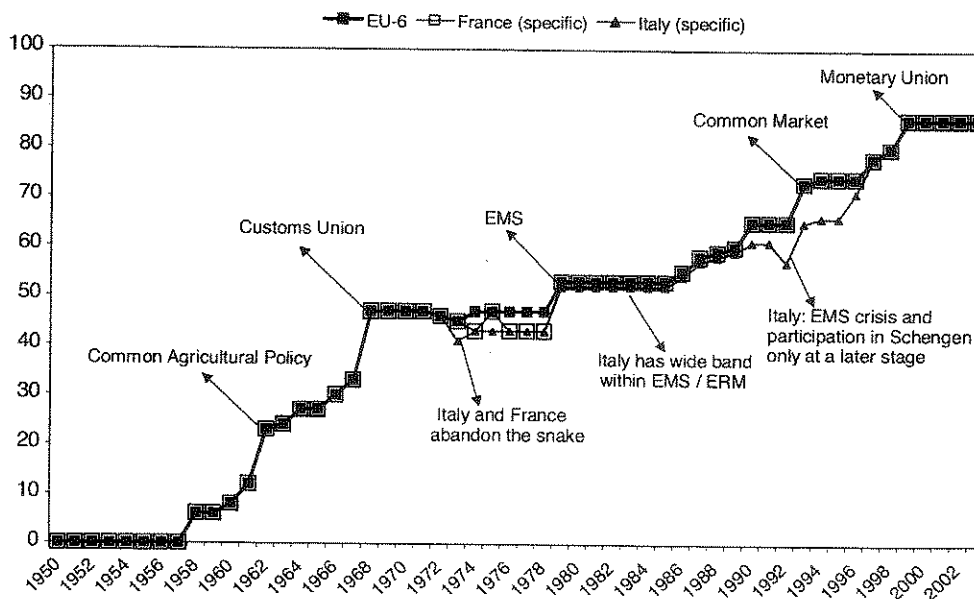

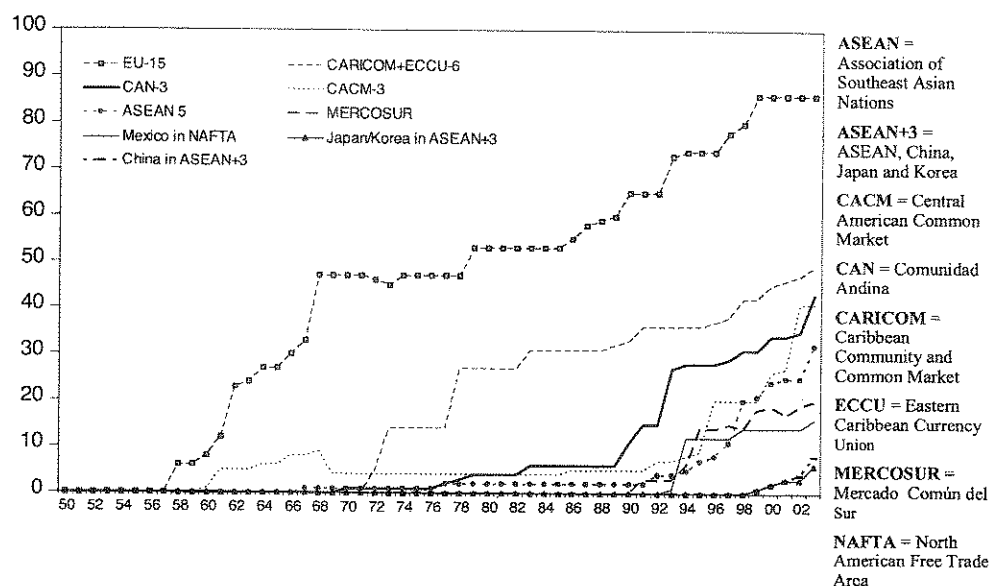*Figure 14.2* Index of institutional integration for the EU, 1950–2004.

Figure 14.3 Index of institutional integration for the EU-15 and various regional arrangements in the world.

UN Economic Commission for Africa (UNECA)

UNECA (2001, 2002, 2004) develops a new indicator system to assess progress in African regional integration since the signing of the Abuja Treaty in 1994 in its Assessing Regional Integration in Africa (ARIA1) Report. The main objectives of the indices are listed as follows:

* '[t]o assess each country's performance and relate it to the goals and objectives of each regional economic community and that of Africa as a whole, as well as to assess the performance of each economic community to that of Africa;
* to compare the contributions of each member country in a regional economic community towards the realisation of such goals and objectives, in addition to the contributions that each regional economic community has made towards the realisation of goals and objectives of the continent at large;
* to monitor the performance of each country, regional economic community, and the continent as a whole for regional integration efforts over time;
* to enhance the quality of the analysis by providing indices for scores and rankings at country, regional economic community and continent levels'
(UNECA, 2004: 244)

The structure of the composite indicator is based on eight sectors (or clusters of activities) that are common to the treaties of the regional economic

communities: trade, money and finance, transport, communications, energy, agriculture, manufacturing and human development and labour markets. Progress in these clusters is measured by a variable number of indicators, totalling 19 indicators in the whole system. The data come from published official sources but also from questionnaires that were specifically designed for the purpose. Basic data are normalised transforming them in annual indices taking 1994 as the base year (1994=100).

The Composite Integration Index which assesses the 'relative performance of a regional economic community' is based on these eight sectoral indices for all member countries. Country weights are Gross Domestic Product (GDP) figures; sector weights are based on expert judgement. UNECA also calculates weighted averages of the regional economic community indices, using the corresponding GDP weights of each regional economic community. Indicator values for a selection of African RECs for the 1994–1999 period are shown in Figure 14.4.

Interestingly, in the UNECA proposal two benchmarks are used for the purpose of evaluating and comparing the integration efforts: (i) the self-defined pre-determined targets for target-driven indicators (if they exist for particular integration groupings), and; (ii) an average of the *n* best performers (UNECA 2002: 246–248). Although further improvements and refinements of the indicator system were announced (UNECA 2002: 228, 249), the effort has unfortunately not been sustained in ARIA2, ARIA3 and ARIA4 (UNECA 2004, 2008, 2010).
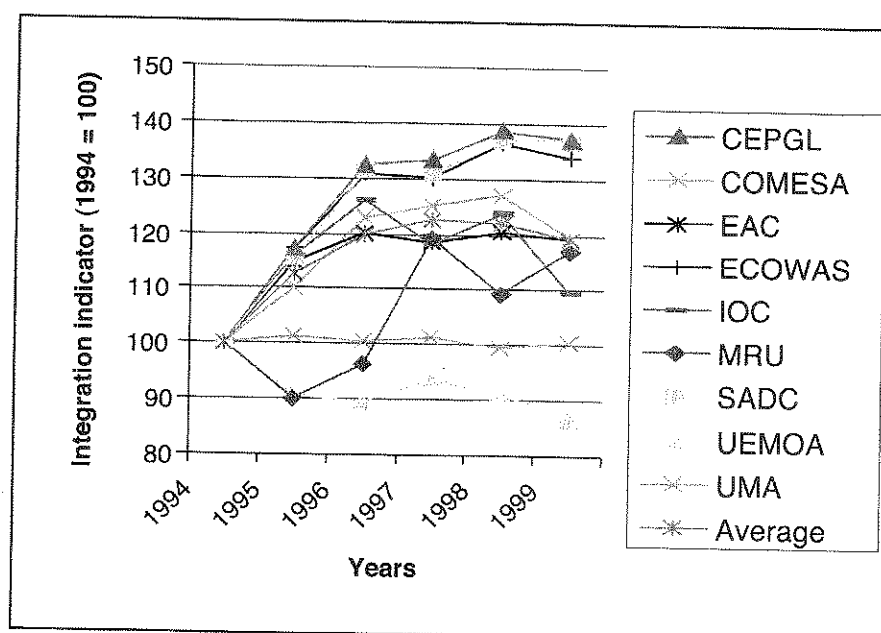

Figure 14.4 Integration indicators for selected African regional economic communities, 1995–1999 (1994 =100).

Source: UNECA (2002).

United Nations Economic and Social Commission for Western Asia (UN-ESCWA)

In its 2006 Annual Review of Developments in Globalisation and Regional Integration in the Arab Countries, UN-ESCWA (2007) presented for the first time a regional Integration Index for the Arab World. The index seeks to measure the degree of openness and interdependence (or 'actual' integration) of individual Arab countries with respect to the region. In its current version, only four variables are used, mainly because of severe data constraints in the region. These variables (or sub-indicators) are: openness to Arab intra-regional trade, openness to Arab intra-regional investment, openness to Arab intra-regional workers' remittances and openness to Arab intra-regional tourism. Country rankings are aggregated using a statistical weighting procedure (principal component analysis). Data for 16 countries (2003–2005 period) are currently covered by the Regional Integration Index. First results show that countries such as Lebanon, Yemen, Jordan and Bahrain are among the most regionally integrated countries in the region, whereas the Maghreb countries such as Algeria, Libyan Arab Jamahiriya, Tunisia and Morocco appear as the laggards in the list.

UN-ESCWA has the intention to further develop this index, basically through the incorporation of additional variables, such as official development aid (ODA), financial sector flows, trade barriers, capital controls, personal contacts and cultural proximity (UN-ESCWA 2007: 42).

A report commissioned by ASEAN: Dennis and Yusof

The report on Developing Indicators of ASEAN Integration (Dennis and Yusof 2003) is a technical document prepared for the ASEAN Secretariat and funded by the Australian Regional Economic Policy Support Facility (REPSF). The objective of the proposal is to measure 'the progress towards economic integration of the 10 ASEAN nations in the context of the aim to move towards an ASEAN Economic Community' (Dennis and Yusof 2003: 1). The authors use a Balassa-type conceptual framework, and discuss, on the one hand, the conceptual differences between integration, openness and interdependence, and on the other, the differences between process, input, outcome and output indicators (Dennis and Yusof 2003: 19–28). The set of indicators that is proposed covers the following areas (dimensions): trade in goods, investment, trade in financial and other services, infrastructure, customs, standards, mutual recognition agreements and conformity assessment, small and medium enterprises, e-ASEAN and intellectual property. The complete set of indicators to monitor the progress of economic integration consists of 145 indicators. However, a limited set of 11 key integration indicators has also been selected to be used in the initial stages of monitoring.[15] A composite ASEAN Economic Integration Index is calculated as a simple arithmetic average of only two of the key indicators: intra-ASEAN trade (as

percentage of ASEAN GDP) and intra-ASEAN Foreign Direct Investment (FDI) (as percentage of ASEAN GDP). In spite of the size and the seriousness of this effort, to our knowledge, this proposal has not been implemented as a monitoring tool for ASEAN.

Conclusion

There are now around 200 sovereign countries that are recognised by the UN, and there are now more than 250 significant international arrangements dealing with forms of economic, financial, and/or monetary integration. In this chapter we have reviewed ten of the most important ones including the EU, MERCOSUR, and others. The composite indices discussed in this chapter are an important step in the analytical process to identify causes and effects of regional integration, and underpin future extensions of this line of research.

The exercise of creating systematic measures of regional integration is important for the purposes of testing hypotheses but also for assessing and comparing progress made by various regional arrangements. As with many complex phenomena, no single measure will likely capture all the various facets, but those described here do capture the most important ones.

An important feature of all the applications and methodologies is that they are multidimensional. This allows each researcher to aggregate, disaggregate, and weight components to suit individual needs. The key is to build indices following careful procedures as described in this chapter or assess existing measures with these same considerations. As with all data, the final product should measure the intended operationalisation.

Notes

1 See Dennis and Yusof (2003:19–23) for a discussion of these concepts in the context of regional integration.
2 See also, OECD (2003a), Dennis and Yusof (2003) and Nardo *et al.* (2005).
3 See De Lombaerde *et al.* (2006).
4 For instance, consolidated trade data are available from the United Nations Commodity Trade Statistics Database (UN-COMTRADE), but for several regions, data on bilateral intra-regional flows are missing. The International Monetary Fund (IMF) provides reliable time series data on dyadic direction of trade, which has been improved by Gleditsch (2002). However, the IMF trade data suffers from not discerning the types of products, economic sectors or intra-industry trade. Detailed data is attainable, but on a region-by-region basis with many missing cases among the LDCs. Even for the Organisation for Economic Cooperation and Development (OECD) member countries systematic data on intra-regional services trade, trade in intermediate and final goods or trade by multinationals is not systematically available (OECD 2004). Currently dyadic FDI data is not readily available for all countries. However, there is regional data available in many cases, but senders of FDI are often unknown. Labour mobility, and migration in general, is also a measure that lacks accuracy and global completeness. Moving from the economic sphere to other spheres of regional interaction

(political interaction, diplomatic tensions, conflict, knowledge flows, etc.) generally involves further constraints with respect to data availability.

5   Compare, for example, with UNECA's consideration of 'clusters' of activities (UNECA 2002).

6   On the discussion about regions, regionalisation and related concepts, see, for example, Hettne and Söderbaum (2000), Van Langenhove (2003) and Söderbaum (2005).

7   The acronyms hereafter are explained in the list of acronyms.

8   Baele *et al.* (2004) further illustrate this complexity. They postulate that financial integration is achieved when all potential market participants with the same relevant characteristics (i) face a single set of rules; (ii) decide to deal with specified financial instruments and/or services; (iii) have equal access to the selected set of financial instruments and/or services; and (iv) are treated equally when they are active in the market.

9   See, for example, Efird and Genna (2002), Feng and Genna (2003), Dorrucci *et al.* (2002, 2004), Genna and Hiroi (2004) and Wu (2006).

10 Standardised values are also called z-values. Other normalisation techniques are available, including: (i) transformation into indicators above and below the mean; (ii) transformation into cyclical indicators; and (iii) calculation of balances of opinions. See, for example, Nardo *et al.* (2005: 11–13).

11 See, for example, Nardo *et al.* (2005: 21–23).

12 An alternative weighting procedure consists in letting the weights reflect the statistical quality of the underlying data, attaching higher weights to higher quality data (Nardo *et al.* 2005: 21).

13 For a systematic comparison of these proposals and other indicator systems, see De Lombaerde *et al.* (2006).

14 For a detailed justification of the inclusion of these variables, see Dorrucci *et al.* (2002: 12–13).

15 These include, intra-ASEAN export index, intra-ASEAN import index, intra-ASEAN trade index, intra-industry-trade index, CEPT usage index, ASEAN FDI index, intra-ASEAN FDI index, ASEAN transnationality index, foreign assets and liabilities indicator, portfolio equity and FDI indicator, ASEAN economic integration index (Dennis and Yusof 2003: 107).

References

Adler, E. and Barnett, M. (2006) 'A Framework for the Study of Security Communities', in E. Adler and M. Barnett (eds) *Security Communities*, 29–65, Cambridge: Cambridge University Press.

Baele, L, Ferrando, A., Hördahl, P., Krylova, E. and Monnet, C. (2004) 'Measuring Financial Integration in the Euro Area', ECB Occasional Paper 14, ECB: Frankfurt.

Balassa, B. (1961) *The Theory of Economic Integration*, Homewood, Illinois: Richard Irwin.

De Lombaerde, P. and Van Langenhove, L. (2006) 'Indicators of Regional Integration: Conceptual and Methodological Aspects', in P. De Lombaerde (ed.) *Assessment and Measurement of Regional Integration*, 9–41, London: Routledge.

De Lombaerde, P., Pietrangeli, G. and Weeratunge, C. (2006) 'Systems of Indicators for Monitoring Regional Integration Processes: Where Do We Stand?', *Integrated Assessment Journal*, 8(2): 39–67.

Dennis, D.J. and Yusof, A.Z. (2003) 'Developing Indicators of ASEAN Integration – A Preliminary Survey for a Road Map', AusAID/REPSF Project 02/001, Final Report.

Deutsch, K.W., Burrell, S.A., Kann, R.A., Lee, M., Lichterman Jr., M., Lindgren, R.E., Loewenheim, F.L. and Van Wagenen, R.W. (1957) *Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience*, Princeton: Princeton University Press.

Dorrucci, E., Firpo, S., Fratzscher, M. and Mongelli, F.P. (2002) 'European Integration: What lessons for other regions? The case of Latin America', ECB Working Paper 185, ECB: Frankfurt.

Dorrucci, E., Firpo, S., Fratzscher, M. and Mongelli, F.P. (2004) 'The Link Between Institutional and Economic Integration: Insights for Latin America from the European Experience', *Open Economies Review*, 15: 239–260.

Efird, B. and Genna, G.M. (2002) 'Structural Conditions and the Propensity for Regional Integration', *European Union Politics*, 3(3): 267–295.

Feng, Y. and Genna, G.M. (2003) 'Regional Integration and Domestic Institutional Homogeneity: A Comparative Analysis of Regional Integration in the Americas, Pacific Asia and Western Europe', *Review of International Political Economy*, 10(2): 278–309.

Feng, Y. and Genna, G.M. (2004) 'Domestic Institutional Convergence and Regional Integration: Further Evidence', in I.D. Salavrakos (ed.) *Aspects of Globalization, Regionalisation and Business*, 23–37, Athens: Atiner.

Feng, Y. and Genna, G.M. (2005) 'Measuring Regional Integration', paper presented at the Claremont Regional Integration Workshop with Particular Reference to Asia, Claremont, 25 February.

Frankel, J. and Rose, A. (1998) 'The Endogeneity of the Optimum Currency Area Criteria', *The Economic Journal*, 108: 1009–1025.

Genna, G.M. and Hiroi, T. (2004) 'Power Preponderance and Domestic Politics: Explaining Regional Economic Integration in Latin America and the Caribbean, 1960–1997', *International Interactions*, 30(2): 143–164.

Gleditsch, K.S. (2002) 'Expanded Trade and GDP Data', *Journal of Conflict Resolution*, 46(5): 712–724.

Hettne, B. and Söderbaum, F. (2000) 'Theorizing the Rise of Regionness', *New Political Economy*, 5(3): 457–473.

Hufbauer, G.C. and Schott, J.J. (1994) *Western Hemisphere Economic Integration*, Washington: Institute for International Economics.

Mongelli, F.P., Dorrucci, E. and Agur, I. (2007) 'What does European Institutional Integration tell us about Trade Integration?', *Integration & Trade*, 26(11): 151–200.

Nardo, M. *et al.* (2005) *Handbook on Constructing Composite Indicators: Methodology and User Guide*, OECD: Paris.

OECD (2003a) *Quality Framework and Guidelines for OECD Statistical Activities*, Online. Available at <www.oecd.org/statistics>.

OECD (2003b) *Composite Indicators of Country Performance: A Critical Assessment*, Paris: OECD.

OECD (2004) *Handbook on Economic Globalisation Indicators*, DSTI, Paris: OECD.

Pinder, J. (1968) 'Positive Integration and Negative Integration: Some Problems of Economic Union in the EEC', *The World Today*, 24(3): 89–110.

Söderbaum, F. (2005) 'Exploring the Links between Micro-Regionalism and Macro-Regionalism', in M. Farrell, B. Hettne and L. Van Langenhove (eds) *Global Politics of Regionalism*, 87–103, London: Pluto Books.

Tinbergen, J. (1954) *International Economic Integration*, Amsterdam: Elsevier.

UNECA (2001) *Annual Report on Integration in Africa. Methodology for Calculating Indices*

of Economic Integration Effort in Africa, Addis Ababa: UN Economic Commission for Africa.

UNECA (2002) *Annual Report on Integration in Africa 2002*, Addis Ababa: UN Economic Commission for Africa.

UNECA (2004) *Assessing Regional Integration in Africa*, ECA Policy Research Report, Addis Ababa: UN-ECA.

UNECA (2008). *Assessing Regional Integration in Africa III*, Addis Ababa: UNECA.

UNECA (2010). *Assessing Regional Integration in Africa IV*, Addis Ababa: UNECA.

UN-ESCWA (2007) *Annual Review of Developments in Globalization and Regional Integration in the Arab Countries, 2006*, New York: United Nations.

Van Langenhove, L. (2003) 'Theorizing Regionhood', UNU-CRIS Working Papers W-2003/1, Bruges: UNU-CRIS.

Wu, J.P. (2006) 'Measuring and Explaining Levels of Regional Economic Integration', in P. De Lombaerde (ed.) *Assessment and Measurement of Regional Integration*, 162–179, London: Routledge.