



STATISTICS DIRECTORATE

National Accounts and Economic Statistics - International Trade Statistics

A TAXONOMY OF STATISTICAL INDICATORS FOR THE ANALYSIS OF INTERNATIONAL TRADE AND PRODUCTION

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I. Introduction

1. The empirical analysis of international economic transactions has been gradually developing for the last decades, motivated by the progress of integration policies, and sustained by the increasing availability of detailed data and qualitative information.
2. An overwhelming variety of statistical tools is currently used for many different kinds of analytical needs.
3. This note contains a first attempt at taking stock of this enormous literature¹, by proposing a simple classification of the main statistical indicators, that could be useful for the OECD *Trade Indicators Project*.
4. Indicators are here defined as combinations of *two or more* elementary variables. Simple computations on *single* variables, such as percentage shares or growth rates, even when they are compared across different units of observations, as when one wants to distinguish between dynamic and slow sectors, are not taken into account. This is true even when, for example, a single percentage share has a precise economic meaning, such in the case of the dependence on primary exports².
5. At the other extreme, this taxonomy will generally not include indicators aimed at evaluating the *linkages* between different variables, in terms of the impact that one of them exerts upon another³. This is usually not possible with a single indicator, but requires the specification of a more or less complex model linking the different variables.

¹ Some general surveys, which have been particularly useful for the compilation of this taxonomy, are contained in De Benedictis and Tamberi (2001), Drysdale and Garnaut (1982), Greenaway and Milner (1993), Kol and Mennes (1986), Kunimoto (1977), Laursen (1998), Ng (2002), OECD (2003), Pritchett (1996), Rose (2002), Silber (1991), Vollrath (1991).

² For the same reason, an indicator such as the ratio of intermediate goods in total trade, which could be taken as a measure of the degree of vertical fragmentation in international trade relations, will not be taken into account.

³ A reference to this class of possible indicators is contained in OECD (2002).

6. The classification embraces indicators related to the most important real aspects of the international economy, such as trade, investment, technology transfers, migrations, as well as the relevant policies. However, the underlying variables will not be examined in the survey⁴.

7. Several criteria can be used to classify international trade and production indicators. For example, indicators could be distinguished according to the level of aggregation for which they are more relevant (macroeconomic *versus* structural indicators); or to the range of underlying variables (trade indicators, investment indicators, combined indicators), and so on.

8. This taxonomy is based on a rather arbitrary identification of the most important analytical problems that can be addressed with each indicator. Since some of them could obviously be used for more than one purpose, they will appear in more than one category.

9. Under each heading I have listed a selection of indicators, with some relevant bibliographic references. At this stage of the project the list is still largely incomplete.

II. International integration indicators

II.1 Trade openness

10. Indicators based on GDP:

- Trade/GDP ratio
- Import penetration and propensity
- Export propensity

11. Indicators based on input/output tables:

- Value added generated by exports / GDP
- Import content of exports

12. Indicators based on population

- Adjusted trade openness indicators (Frankel, 1997)

II.2 International production openness

13. Indicators based on FDI:

- FDI flows to GDP
- FDI flows to gross capital formation
- Inward FDI index (UNCTAD, 2001)

14. Indicators based on foreign affiliates activities⁵

- Foreign affiliates' share of value added (in the host or in the home country)
- Foreign affiliates' share of employment (in the host or in the home country)
- Foreign affiliates' sales / exports

⁴ A large part of the discussion in OECD (2003) is focused on the choice of the most relevant *variables* used to measure globalisation.

⁵ See OECD (2003) and Barba Navaretti *et al.* (2002). Many of the indicators based on trade data can also be computed with reference to an 'extended' definition of exports and imports, including also the sales of foreign affiliates.

II.3 International technology transfers

15. Foreign affiliates' share of R&D expenditure (in the host or in the home country)
16. Foreign affiliates' share of patents (Archibugi and Iammarino, 2002)

II.4 International migrations

17. Immigrant population's share of the labour force

II.5 Indicators based on price convergence

18. Price distortion indicators (Dollar, 1992)

II.6 Composite indices of international integration**III. Policy openness/restrictiveness indicators*****III.1 Trade taxes and subsidies***

19. Simple or weighted average tariff rates (UNCTAD, 1988)
 - applied tariffs
 - bound tariffs
20. Trade taxation ratios (Edwards, 1997)
 - Customs duties collected to imports (ex-post weighted protection rate)
 - Duty-free trade to total imports
21. Effective rates of protection (Heitger, 1987)
22. Effective rates of assistance

III.2 Non-tariff barriers

23. Simple or weighted coverage ratios (Nogues et al., 1986; Laird and Yeats, 1988)
24. Tariff-equivalents of NTBs (Yeats and Roningen, 1977)
25. Domestic resource costs (Srinivasan and Bhagwati, 1978)

III.3 Measures based on prices

26. Trade bias measures (Greenaway and Reed, 1990)
27. Incidence analysis and shift parameters (Greenaway and Milner, 1993)
28. Trade restrictiveness benchmarks (Anderson, 1998)

III.4 Qualitative indicators

29. Trade restrictiveness index (McGuire and Findlay, 2001)

30. Composite indicators of trade policy openness (Sachs and Warner, 1995; Harrison, 1996)
31. Indicators of market regulation (Nicoletti et al., 2000)

III.5 Measures based on residuals from econometric estimations

32. Structurally adjusted trade openness indicators (Balassa, 1985)
33. Endowment-adjusted trade openness indicators (Leamer, 1988)
34. Trade intervention indices (Leamer, 1988)
35. Rao trade openness indices (Rao, 1998)
36. Measures based on gravity models (Hiscox and Kastner, 2002)

IV. Performance and competitiveness indicators

IV.1 Net trade indicators

37. Trade balance
38. Coverage ratio
39. Normalised trade balance
40. Contribution to the trade balance (Lafay, 1992)

IV.2 Market shares

41. Import penetration
42. Export market share
43. Export performance (Durand et al., 1992)
44. Overall market share (considering also domestic producers)

IV.3 Price indicators

45. Terms of trade – Import capacity
46. Relative export profitability
47. Exchange rate pass-through on trade prices
48. Real effective exchange rates (Lipschitz and McDonald, 1991; Durand et al., 1992)
49. Import competitiveness

IV.4 Composite indices

- 50. Trade performance index (ITC, 2002)
- 51. Composite indices of competitiveness

V. Structural indicators***V.1 Single-flow indicators of trade intensity and specialization***

- 52. Bilateral trade intensity indices (Savage and Deutsch, 1960; Kunimoto, 1977; Drysdale and Garnaut, 1982; Vollrath, 1991)
- 53. Intra-regional trade intensity indices (Anderson and Norheim, 1993; Frankel, 1997; Iapadre, 2000)
- 54. Balassa revealed comparative advantage index (Balassa, 1965; De Benedictis and Tamberi, 2001)
- 55. Symmetric revealed comparative indices (Dalum et al., 1998; Jungmittag et al., 1998)
- 56. Implicit comparative advantage indices (Webster, 1991)

V.2 Net-trade indicators of specialization

- 57. Michaely index (Michaely, 1962a; Laursen, 1998)
- 58. Contribution to the trade balance (Lafay, 1992)
- 59. Net-trade specialization index (Iapadre, 2001)

V.3 Inter- / Intra-industry trade intensity

- 60. Grubel-Lloyd index (Grubel and Lloyd, 1975; Vona, 1990; Greenaway and Torstensson, 1997)
- 61. CEPPI index (Abd-el-Rahman, 1986; Fontagné and Freudenberg, 1997)
- 62. Vona index (Vona, 1991; Iapadre, 2003)
- 63. Vertical / Horizontal intra-industry trade (Greenaway et al., 1994; Fontagné and Freudenberg, 1997)
- 64. Marginal intra-industry trade (Hamilton and Kniest, 1991; Brühlhart, 2001; Iapadre, 2003)
- 65. Intra-industry foreign direct investment indices (Greenaway et al., 2001)

V.4 Intra-firm trade indicators (OECD, 2003)***V.5 Measures of similarity***

- 66. Finger-Kreinin index (Michaely, 1962b; Finger and Kreinin, 1979).

67. Measures of complementarity between specialization patterns (Drysdale and Garnaut, 1982; Ng, 2002)

68. Similarity between trade and investment distributions

V.6 Measures of concentration and diversification

69. Share of top n items

70. Herfindahl index and the “equivalent number”

71. Hirschmann index

72. Gini index (Amiti, 1999)

73. A Finger-Kreinin measure of diversification (Ng, 2002)

VI. Structural decomposition techniques

74. Constant-market-shares analysis (Fagerberg and Sollie, 1987; Milana, 1988; Iapadre,)

75. Export market growth (Durand et al., 1992)

76. Measures of quality change in trade flows based on the decomposition of export unit values (Aw and Roberts, 1986)

VII. Issues not considered

VII.1 Definition of variables

77. Statistical concepts (e.g. customs versus BOP definitions)

78. Data at current / constant prices

79. Aggregation methods, e.g. market *versus* purchasing-power-parity exchange rates

VII.2 Classification criteria

80. Technological content

81. Mode of supply (trade in services)

VII.3 Statistical territories and geographic nomenclature

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