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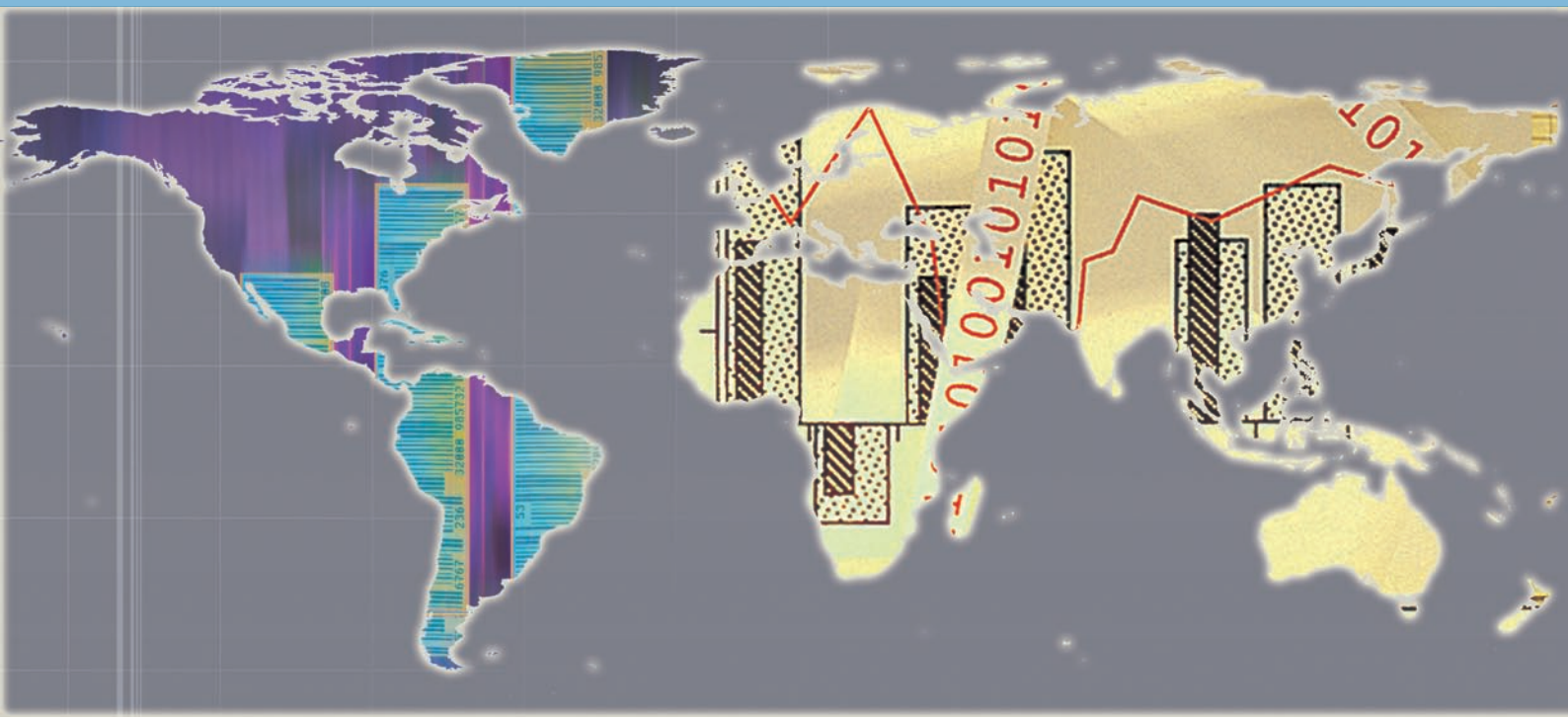

Structural Change in the World Economy:
Main Features and Trends

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Structural Change in the World Economy: Main Features and Trends

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Abstract

This working paper presents a quantitative analysis of sectoral trends in the global economy. After surveying the relevant theoretical and empirical literature on structural change, we discuss the historical evolution of agriculture, industry and services in terms of their share of world value added. This analysis refers to six continental regions and covers a period of 40 years. Constant-market-shares (CMS) analysis is then used to investigate changes in the contribution of regional aggregates to world production. This is followed by an analysis of the evolution of the manufacturing industry and the intensity of structural change for a sample of 30 countries and 18 sub-sectors for which data are available in the UNIDO INDSTAT 2, 2009 database. Three main findings resulted from the analysis. First, the long-term rise in the share of services in global value added has been slowing down in the last decade. Second, the upward trend in the global value added share of North America and Asia seems to be partly reverted in favour of other regions. Third, after a setback during the 1980s, structural transformation in the manufacturing sector has been accelerating in the last two decades. The purpose of this paper is to provide a starting point for more specific studies at sector, national and regional level.

Introduction

The terms “structure” and “structural change” have become widely used in economic research, although with different meanings and interpretations. In development economics and in economic history, structural change is commonly understood as “the different arrangements of productive activity in the economy and different distributions of productive factors among various sectors of the economy, various occupations, geographic regions, types of product, etc …” (Machlup, 1991: 76 in Silva and Teixeira, 2008: 275). This paper uses such notion of structural change to analyze the recent evolution of the international economy in a long-term perspective.

The rise of new economic powers has generally been driven by the rapid structural transformation of their economies, featured by the shift from primary production, such as mining and agriculture to manufacturing; and in manufacturing from natural-resource-based to more sophisticated, skill- and technology-intensive activities. With urbanisation, labor-intensive manufacturing activities grow faster than primary activities, generating new jobs, income and demand. Capital accumulation leads to a more sophisticated manufacturing structure and the economy gradually moves to skill- and technology-intensive sectors. Deepening in manufacturing sophistication corresponds to changes in the availability and quality of production factors and to the reduction of transaction costs thanks to a proper supply of infrastructure, utilities and regulatory framework.

Since 1945, developing economies have gradually become involved in the industrialisation process with their manufacturing sector growing faster than mining and agriculture. But aggregate patterns often hide large differences at regional or national level. Different endowments of productive factors, specific historical and geographical conditions, all contribute to the great diversity of development paths across countries (Szirmai, 2009).

Latin America benefited from early entry into the industrialisation process, with some countries pursuing import substitution policies already in 1930s. Many Latin American economies experienced sustained economic growth until the beginning of 1980s, when their industrial output started decreasing. Among Asian economies, Japan represents the first mover in the industrialisation process and from the 1960s newly industrialised economies (NIEs), such as Republic of Korea, Taiwan province of China, Hong Kong SAR and Singapore, have followed its path. In most cases, these countries rapidly changed their industrial structure, moving from low-skilled to more sophisticated production. In the last twenty years, the rise of China as one of the largest manufacturing producers in the world, currently making up for around 10 per cent of world value added, represents the most striking phenomenon in the region. In contrast, most African countries still remain on the margins of the industrialisation processes.

Different trends are observed since the 1970s. The service sector has become the dominant economic activity, while the role of agriculture and manufacturing has declined. Timmer and Akkus (2008) consider this as a natural developing process, a "powerful historical pathway of structural transformation," which leads every country to move from agriculture to industry and then to services.

To some extent, this can be explained by the decrease in relative prices of consumption goods, in conjunction with the simultaneous growth of demand for services with higher income elasticity. However, the trend toward 'tertiarisation' cannot be fully understood without recognizing the role of complex technological and economic transformations, blurring the distinction between manufactured goods and services. The interaction between manufacturing and services, especially of business services, has indeed become stronger and more complex. Many service activities support manufacturing or are based on material inputs and technology-intensive goods produced by the manufacturing sector. Important differentiations have emerged even in the service sector, leading some analysts to identify a process of 'quaternarisation,' characterised by the rise of sophisticated intermediate services, which are used as inputs by other sectors of the economy (Peneder and others, 2001).

Rowthorn (1994) cross-sectional study on 70 countries finds that manufacturing employment increases with per capita income up to a level of US$ 12,000 (at 1991 prices). Beyond this threshold, economic growth is accompanied with a decrease of the manufacturing share of total value added. Given the important role played by manufacturing in generating innovation for the entire economic system, this inverse-U pattern is a source of concern. Baumol's law (Baumol, 1967) explains the slowdown in the productivity dynamics of industrialised economies with the rising share of services with less potential for productivity growth, as many service activities are labour intensive (structural change burden). But this argument was contrasted with the evidence that many services of great importance for manufacturing such as financial intermediation, sales, transport and logistics have experienced significant productivity improvements through the diffusion of information and communication technologies (ICT) (Szirmai, 2009). Therefore, assessing the net effect of tertiarisation on labour productivity requires deeper analysis of specific services to better understand their potential of technological absorption.

In the current phase of globalisation, changes in technology and policy have led to vertical disintegration of production in many industries. Structural change in the global economy is increasingly related to functional and spatial fragmentation of production and consumption and their reintegration through trade. Consequently, trade in intermediate goods has grown faster that that in final goods (Sturgeon and Memedovic, 2010), leading to a higher degree of interdependence among national production systems and higher exposure to external shocks, as

shown by the recent global crisis. Patterns of horizontal specialisation in final goods are being replaced by patterns of vertical specialisation in distinct production units, giving rise to 'kaleidoscopic' comparative advantages, which have become more penetrable and volatile. Hence, the process of tertiarisation (or de-industrialisation) in developed countries has often been associated with rising competitiveness of developing countries' exports and a new international division of labour in manufacturing.

The rest of the paper is organised as follows. Section 1 gives a short summary of the relevant theoretical and empirical literature on structural change. Section 2 describes the main structural changes that have transformed the world economy in the last four decades. The analysis is based on UN Statistics National Account data, and is conducted for seven large International Standard Industrial Classification of all Economic Activities (ISIC) sectors (agriculture, mining and utilities, manufacturing, construction, "transport storage and communications", "wholesale and retail trade, restaurants and hotels" and "other activities"), and six continental regions (Africa, Asia, Europe, Latin America and the Caribbean, North America and Oceania). After describing the main features of long-term structural changes in the world economy and in each region, this section uses the "constant-market-share analysis" method to assess changes in regional shares of world value added in the current decade. Section 3 focuses on the transformation of the manufacturing sector in the last 40 years. The UNIDO ISIC Rev. 3 data at two digits are used to cover a wide selection of countries and to analyse national specialisation patterns and structural change intensity in the manufacturing sector[1]. Section 4 concludes summarizing the main trends observed.

1. Structural change in the literature

Since its origin, economic theory has given significant attention to structural change (Quesnay, 1758; Turgot, 1766; and Steuart 1767). For Adam Smith (1776), structural features were strongly related to the level of economic development while for Ricardo (1817) changing composition of the productive system was a requisite for economic growth.

Although the concept of structural change has been defined in different ways, the most common meaning refers to long-term and persistent shifts in the sectoral composition of economic systems (Chenery and others, 1986; Syrquin, 2007). More specifically, structural change is associated with modifications in the relative importance of different sectors over time, measured by their share of output or employment. Other aspects taken into account are changes in the location of economic activity, such as the urbanisation process, or in a broader sense, changes in the institutional environment. Thus, structural change analysis assumes that economic dynamics

[1] To this purpose, we have used the information available in the new UNIDO INDSTAT 2 2009 database, which contains long time series on value added and production from several countries at 2-digit level of the ISIC classification.

"can be studied by focusing on a relatively small number of groups or activities that comprise the economic system, and thus form the economic structure" (Silva and Teixeira, 2008: 273).

Traditionally, in the economic literature, this analysis has been associated with different growth theories. In Schumpeter's view, innovation (and its dissemination through imitation and further improvements) was the essential force leading to structural economic shifts (Schumpeter, 1939). For Kuznets (1971), "structural changes . . . are required, without which modern economic growth would be impossible" (p. 348). For Pasinetti (1981), economic growth is linked to continuous structural transformation and change. In the last twenty years, neo-Schumpeterian economists show renovated interest in technological innovation, its diffusion and its impact on growth.

While structural transformation was central in the works of the classical economists, most neoclassical authors regard this as a secondary issue. In fact, if the former stressed the importance of movements of labour from traditional activities (such as agriculture) to modern industry as a driving force of economic development, the faith in the allocative efficiency of the market, underlying neoclassical schools of thought, leads to consider structural change as an automatic result of market development, rather than a necessary condition for economic growth. However, empirical evidence confirms the developmental relevance of economic structure (Rodrik, 2006) calling for a renovate interest on its change. The crucial question to be addressed is whether past theoretical contributions on this issue are adequate to describe processes of structural change in the contemporary global economy.

Functional and spatial fragmentation of global value chains has weakened the interdependence of economic activities within the national borders, which was central to the horizontal representation of the economic system by classical economists. Thus, vertical approaches based on "unidirectional relationship and asymmetric dependence in the clustering process" (Silva and Teixeira, 2008: 283) are more useful to formalize structural transformations shaped by globalisation.

Sraffa (1960) and Pasinetti (1973) decompose the economy in distinct *net-product sub-systems* defined by one-way relationships from material inputs to final commodities. Along the vertical structure of these sub-systems, structural change takes the form of the reallocation of production factors from one economic activity to the other. Bhagwati and Deheja (1994: 24-26) use the concept of *kaleidoscope comparative advantage* to stress the volatility of factors determining the geographic location of value chains' units (or tasks) at national, regional and global level.

The understanding of structural change in this new economic setting has important implications for developing countries. First, the opportunity to attract segments of international net-product sub-systems breaks with the Rostow's theory of linear progression between development stages (Rostow, 1960). Second, it redefines the role of industrial policy in relation to the opportunities created by the international mobility of capital. In this regard, Khan and Blankenburg (2009: 14) argued that in successful developing economies, like Malaysia, the state was able to correct market failures to attract domestic and foreign investment in sectors with greater scope for productivity improvement. Thus, in the globalised economy, industrial policy should shift the focus from the protection of 'infant' domestic industries (as it happened during the adoption of import substitution strategies), to improving domestic firms' integration and relative position along international value chains, i.e. moving towards activities with higher value added and scope for productivity improvement.

The UNIDO Industrial Development Report 2009 (IDR) confirms this argument and emphasizes some important stylised facts emerging from the empirical literature on structural change. Diversification and sophistication of productions are identified as the main drivers of middle and low-income countries' competitiveness in the world market (UNIDO, 2009: 11-14). Furthermore task-based production is seen as an opportunity for countries to develop comparative advantages in particular segments of international value chains and to raise technological sophistication, as was the case of Chinese and Indian exports (UNIDO, 2009: 44).

Another important insight of the UNIDO IDR 2009 is that the rising role of all developing countries in international trade conceals very different industrial performances. Over the period 1991-2005 many developing countries increased their exports. In the cases of Latin American and African countries, this was explained by a greater propensity to export rather than an expansion of domestic manufacturing production (UNIDO, 2009: 42). This tendency has been observed for some important sectors like textile and clothing, machinery, equipment and electrical machinery, whose productive capacities moved away from these regions to benefit Asian countries. This picture reveals that even if trade is a relevant driver of industrialisation, nevertheless it is insufficient to explain the dynamics of structural change.

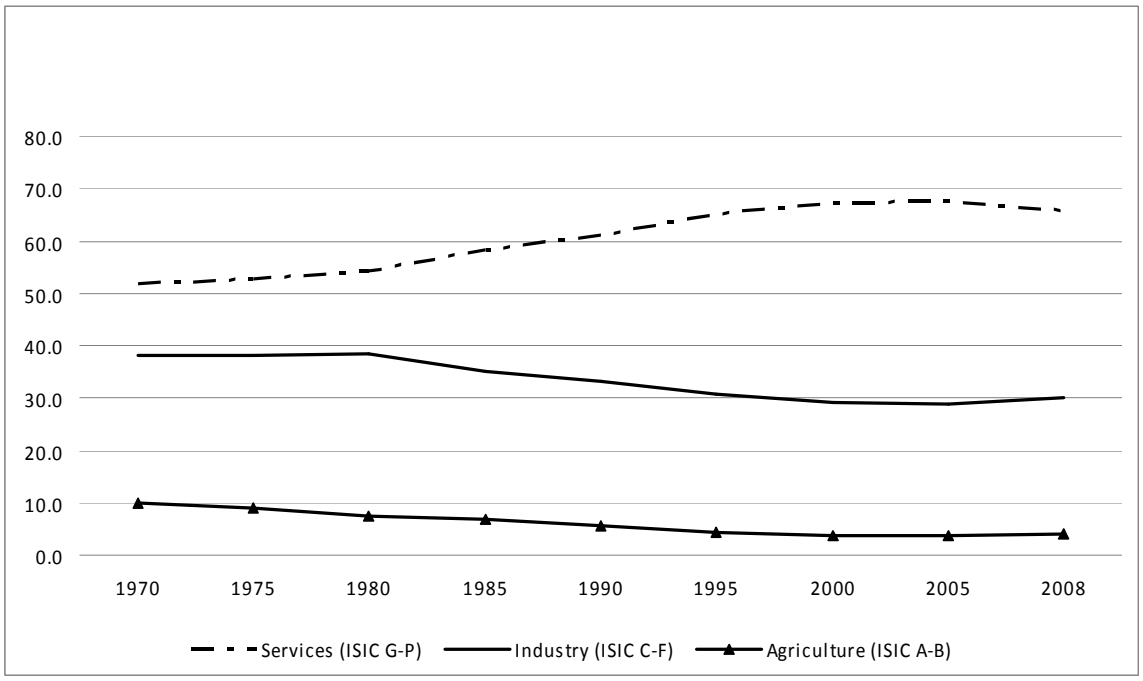
The following sections of the paper present a quantitative analysis of the long-term structural changes in the world economy and in each region. This analysis refers to six continental regions and covers a period of 40 years. Constant-market-shares (CMS) analysis is used to investigate changes in the contribution of regional aggregates to world production. This is followed by an analysis of the evolution of the manufacturing industry and the intensity of structural change for a sample of 30 countries and 18 sub-sectors for which data are available in the UNIDO INDSTAT 2, 2009 database, which provides consistent time series over a period of 40 years.

2. Changes in the structure of world production

2.1 The distribution of production across sectors

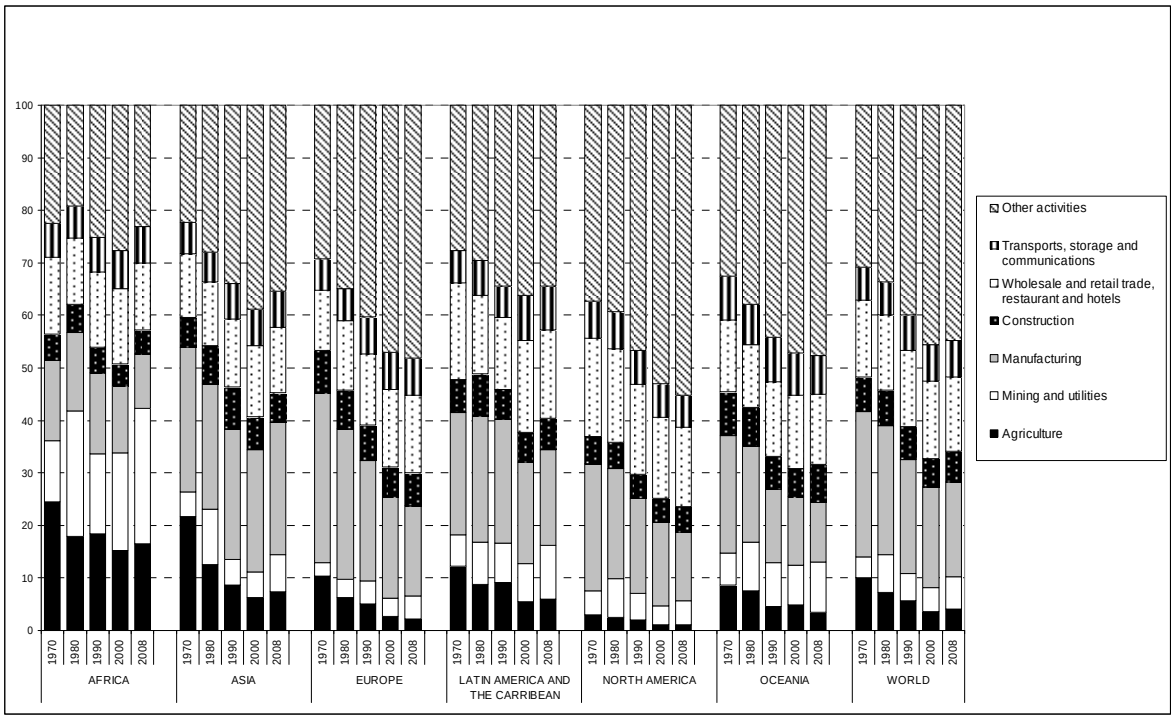
The productive structure of the world economy has changed rapidly in the last decades, reinforcing the established trends from the past. In terms of value added at current prices and exchange rates (Figure 1a and 1b and Table 4 in Annex), the service sector was already dominant in 1970, making 52 per cent of world production and 68 per cent in 2005. The respective shares of agriculture were 10 per cent in 1970 and 3.6 per cent in 2005, and those of industry 38 to 29 per cent. These figures support the view that tertiarisation was the dominant feature of structural change in the global economy, and that the economic development reached the stage in which not only agriculture but also the industrial sector was growing more slowly.

Figure 1a World value added by sector



Source: UNIDO calculation based on UN Statistics (data in current prices, in US$).

Figure 1b World value added by sector



Source: UNIDO calculation based on UN Statistics (data in current prices, in US$).

The most recent trends are not entirely consistent with the previous period. Between 2005 and 2008 the growth of world value added has been slower in the service sector than in agriculture and industry. This setback of the tertiarisation process can partly be explained by the recent increases in the relative prices of agricultural and mineral products, which have sustained their share of world value added. In addition, the shares of manufacturing and construction have also risen, reversing a long-standing downward trend.

The fall of the service sector's contribution to world production has concentrated in the "other activities" grouping, including financial intermediation and a wide range of personal and business services. The share of "transports, storage and communications," remained stable between 2005 and 2008, whereas that of "wholesale and retail trade, restaurant and hotels" slightly decreased.

The African economy is characterised by a fairly strong specialisation in agriculture and in the mining industry. Three distinct phases are clearly visible in the data on its structural evolution in the last four decades, which were mainly driven by the swings in relative prices of mineral products. The Seventies were characterised by a strong rise in the value-added share of industry and in particular of "mining and utilities". Opposite trends emerged between 1980 and 1995, when the service sector's share went over 50 per cent. Since then, a rapid recovery was recorded by "mining and utilities," and more recently by agriculture. In other words, the African

economy has further deepened its specialisation in raw materials' production to the detriment of manufacturing and services, whose combined share of total value added fell from 65 to 53 percent between 1995 and 2008.

The structural transformation pattern in the Asian economy shows a strong specialisation in agriculture and to a certain extent the influence of changes in the relative prices of raw materials. An unabated process of tertiarisation is visible until 2000, with the value-added share of services rising from 40 to 59 per cent, mainly to the detriment of agriculture, which fell from 22 to 6 percent. The current decade is characterised by different trends: the share of industry rose from 34 to 38 percent, as a result of the growth in "mining and utilities" and manufacturing, and even agriculture recouped a small part of its previous losses, reaching a share of over 7 per cent in 2008.

Even in Europe, the tertiarisation process, shown by the rising value-added share of services (from 47 to 71 per cent between 1970 and 2005), slightly receded in the last three years, to the advantage of "mining and utilities" and the construction industry, the only non-service sector in which Europe appears specialised. The shares of agriculture and manufacturing, with declining trends in the previous decades, stabilised at 2 and 17 percent respectively.

In Latin America, services' contribution to value added rose only until 1995 when it reached 63 per cent. The ensuing fall, particularly marked in the sector of "other activities," was accompanied by the recovery of "mining and utilities", but the share of manufacturing has continued to decline. In the last three years even agricultural products have recouped part of their previous losses, benefiting from the rise in their relative prices.

North America is the only region where tertiarisation has continued throughout the whole period, with services' value-added share rising from 63 to 76 percent between 1970 and 2008, though slowing its pace in the last three years. The agricultural sector touched what seems to be the floor of around 1 percent already in 2000, while the share of the manufacturing industry continued to decline and reached 13 per cent in 2008. North America's specialisation is fairly strong in the "other services" grouping, but the share of transports, storage and communications is lower than the world average.

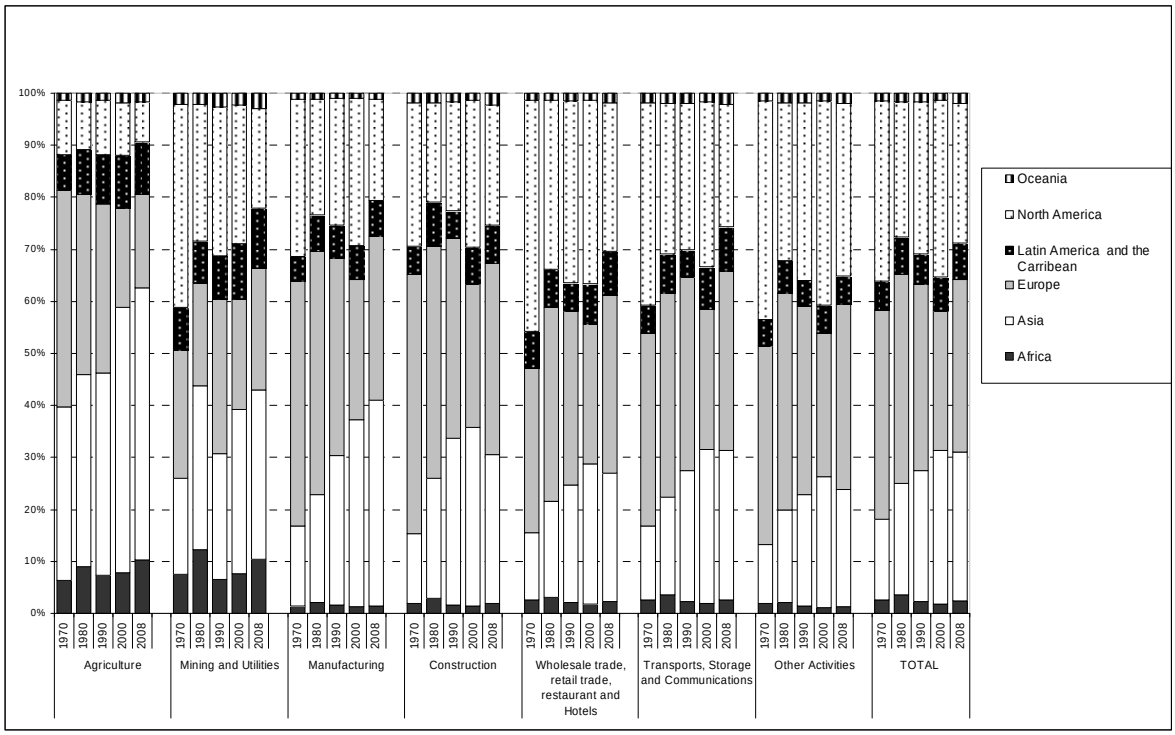
In Oceania, the tertiarisation process reached its peak in 2000, with a value-added share of services of more than 69 per cent, and then declined. This was entirely offset by "mining and utilities" and construction, representing the sectors in which Oceania's economy is more specialised.

2.2 Regional shares of world value added

Structural changes in the world economy can also be analysed by monitoring regional contributions to the world value added over time, which can be seen as *ex-post* indicators of regional competitive performances on domestic and foreign markets. Starting from total production, the most important long-term changes are clearly visible in Figures 2a and 2b. The share of Asia in world production grew from 15.5 to 28.5 per cent between 1970 and 2008 at the expense of Europe and North America, whose shares fell respectively from 40 to 33 and from 35 to 27 per cent. Latin America and Oceania recorded marginal gains, while the share of Africa remained low.

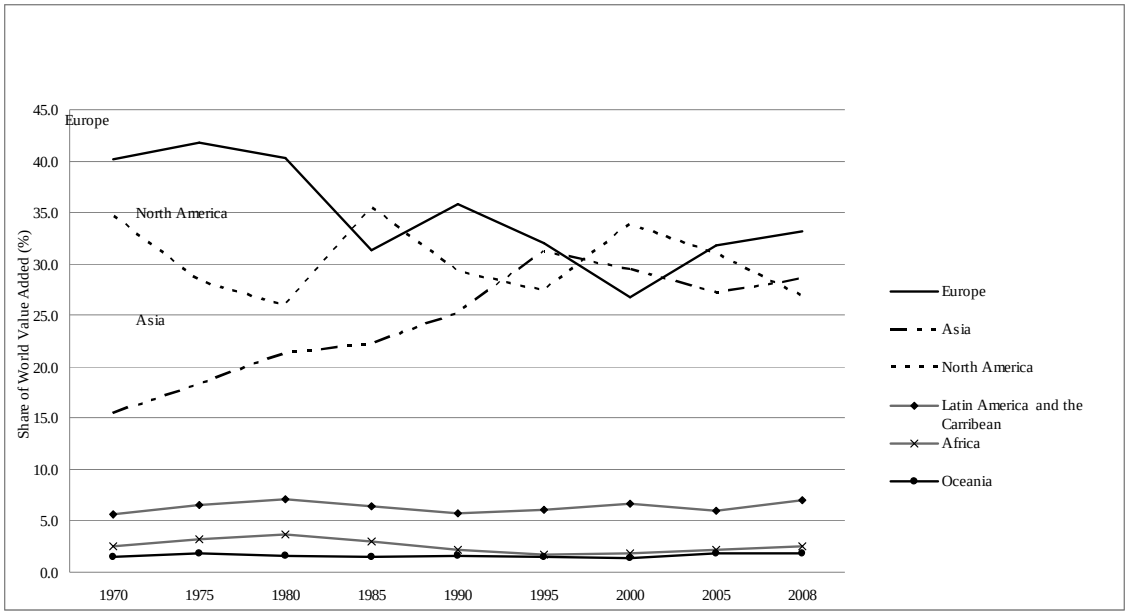
This broad picture is the outcome of different trends over different periods. The share of Asia reached its maximum already in 1995 (31per cent) and lost four percentage points in the following decade, before partly recovering in the last three years. Conversely, Europe's share, after reaching its minimum in 2000, gained more than six percentage points in the current decade, due to the sharp fall of North America's share, which also allowed for a rise of Africa, Latin America and Oceania.

Figure 2a World Value Added by Region (% shares in current prices and exchange rates)



Source: UNIDO calculation based on UN Statistics (data in current prices, in US$).

Figure 2b World Value Added by Region (% shares in current prices and exchange rates), 1970-2008



Source: UNIDO Calculations base on UN Statistics (data in current prices in US $).

CMS analysis

A better understanding of these changes can be obtained by applying a structural decomposition technique, which has often been used in the analysis of export market shares, where it is known as "constant-market-shares" (CMS) analysis, and is described in detail in a related UNIDO working paper (Memedovic and Iapadre, 2009).

This technique allows to measure how much changes in regional aggregate shares of world value added are due to share changes at the sector level, which is named performance effect,[2] or to the correlation between regional specialisation patterns and changes in the sector structure of world value added, which is named structure effect, or between changes in regional specialisation patterns and changes in the sector structure of world value added, named adaptation effect.

Here CMS analysis is applied to changes in regional shares of world value added between 2000 and 2008. As mentioned, this period has been characterised by fairly new trends, a fall in the shares of Asia (from 29.5 to 28.5 percent) and North America (from 33.8 to 26.9), to the benefit of Europe (from 26.8 to 33.2) and, to a lesser extent, of Africa (from 1.9 to 2.5), Latin America (from 6.6 to 7) and Oceania (from 1.4 to 1.9).

[2] When CMS analysis is applied to exports, the performance effect is normally named 'competitiveness effect'.

In this decade, the sector composition of world value added shows a setback of the tertiarisation process, with the share of services falling from 67.3 to 65.9 per cent, coupled with a further shrinking of the manufacturing share (from 19.2 to 18.1), to the benefit of agriculture (from 3.6 to 4), mining and utilities (from 4.5 to 6.2) and construction (from 5.4 to 5.7). These structural shifts have also affected changes in aggregate regional shares of world value added, by favouring regions such as Africa and Latin America, which are more specialised in agricultural and mineral products. In interpreting these changes, it should be reminded that value-added data are measured in current prices and therefore are largely influenced by changes in the relative prices of raw materials.

CMS analysis of the above changes allows gauging the relative importance of performance, structure and adaptation effects, showing that on average the performance effect was the main driver of regional value-added shares. CMS analysis allows also computing the contributions of each sector to each of the three effects and to the total change of regional shares (Table 6 in Annex).

As expected, the structure effect was positive for regions specialised in agriculture and "mining and utilities", such as Africa, where it explains 24 percent of the total increase in the region's contribution to world value added; in Latin America, where it explains 28 per cent of the region's gain; in Oceania where it explains 4 per cent; and in Asia where it offsets to a small extent (15 per cent) the negative performance effect. The structure effect was negative in Europe and North America, because of their specialisation in services, but its size was very small.

The large performance effect of opposite sign, recorded by Europe and North America, can be partly attributed to the euro appreciation relative to the US dollar. Other things being equal, the nominal impact of exchange rate changes on the relative prices of regional products tends to be larger than the ensuing substitution effects in the relative quantity of tradable products. The large part of aggregate value added that is not exposed to international competition is affected only by the nominal impact of exchange rate fluctuations. Moreover, even in tradable sectors, the size of the substitution effects may be lower than commonly believed.

The decrease in North America's share of world value added resulted from a widespread negative performance effect, reinforced by the structure effect. The main sectoral contributions to this fall came from services and manufacturing, but the performance effect was negative in every sector. Symmetrically, the rise in Europe's share was determined by a positive performance effect (except in agriculture), though marginally eroded by the negative structure effect (except in mining and utilities, and construction) (Annex: Table 6). In the specific case of

manufacturing the positive performance effect (0.82) was partly offset by negative structure (-0.27) and adaptation effects (-0.02), caused by its shrinking importance in world value added.
For Asia, the negative contributions of all the service sectors to performance and structure effects were partly offset by the positive contributions of "mining and utilities", agriculture, and manufacturing. In the latter sector, the positive performance effect was considerably larger than its negative contribution to the structure effects. Agriculture and "mining and utilities" are the main contributors to the raise of Africa's and Latin America's shares of world value added, but contributions to performance effects were positive in all sectors for these regions. For Oceania, the service sector explains more than half of the total share's raise, but positive contributions have come from all the other sectors, except agriculture.

3. Changes in the structure of the world manufacturing industry

This section presents long-term trends in the sector structure of the world manufacturing industry, using data on real value added. Data availability problems do not allow building regional aggregates similar to those used in Section 2. Hence the analysis is limited to a selected group of developed and developing countries. But whenever possible, data were expressed in real terms,[3] to control for the nominal impact of changes in relative prices on the structure of production, and prevent data interpretation problems similar to those discussed in Section 2. A group of 30 countries was selected for our database and is listed in the Annex. This group is used as a benchmark to assess relative specialisation patterns over the period 1970-2006.[4]

The structure of manufacturing production for this group of countries shows clear trends (Table 1): a strong raise in the value-added shares of industries producing information and communication technologies (ICT), machinery, transport equipment, precision instruments, chemical, plastics and rubber products, at the expense of all other industries, including traditional consumption goods and metal products. Most of the change occurred in the Seventies, when the combined share of ICT and machinery rose from 10 to 19 per cent. In the following decades their raise was more moderate, up to a share of 22 per cent in 2006.

The most recent years have broadly confirmed these trends, except for the electrical and telecommunication industries, which lost 0.4 percentage points, because of the losses in European and North American countries. A fairly new phenomenon is also the slight raise in the share of the food and beverage industry, concentrated in the two American groupings and in European countries.

[3] Exceptions: China, Ethiopia and Kenya.
[4] Other countries are included in the database only for a limited number of years, and have been excluded from our benchmark, even though some of them, such as China, have been analyzed in this paper also in comparison with our benchmark.

Having observed these regional trends, it must be noted that nation patterns of manufacturing production still show large differences. Section 3.1 presents the data on the industry distribution of manufacturing value added for a subset of the countries in our database, including 24 developed and developing countries from different regions. Each country's industrial structure in the last available year is compared to the benchmark shown in Table 1, to identify sectors of specialisation. The main changes over time are also presented to detect the evolution of industrial specialisation patterns. Section 3.2 presents some simple measures of structural change and concentration of national specialisation patterns.

Table 1 Structure of the manufacturing industry (30 countries), 1970-2006*

ISIC code		1970	1980	1990	2000	2006
15	Food and beverages	13.6	12.7	12.0	11.6	11.9
16	Tobacco products	2.5	2.1	1.6	1.4	1.0
17	Textiles	5.0	4.1	3.4	2.5	1.9
18+19	Wearing apparel, fur + Leather, leather products and footwear	3.9	3.5	3.0	2.0	1.3
20	Wood products (excl. furniture)	3.5	2.4	2.1	1.8	1.7
21	Paper and paper products	4.2	3.8	3.9	3.7	3.5
22	Printing and publishing	5.1	4.7	4.8	4.6	4.1
23	Coke, refined petroleum products, nuclear fuel	2.9	2.5	2.3	2.2	2.3
24	Chemicals and chemical products	8.7	9.5	10.3	11.0	12.0
25	Rubber and plastics products	3.4	3.6	4.3	4.7	4.5
26	Non-metallic mineral products	4.9	4.6	4.1	3.7	3.7
27	Basic metals	6.8	5.4	4.4	4.3	4.4
28	Fabricated metal products	9.6	8.4	7.4	7.0	6.6
29+30	Machinery and equipment n.e.c. + Office, accounting and computing machinery	5.8	10.9	11.2	10.5	10.9
31+32	Electrical machinery and apparatus + Radio, television and communication equipment	4.6	8.3	9.8	11.6	11.2
33	Medical, precision and optical instruments	1.8	2.2	3.1	3.5	4.0
34+35	Motor vehicles, trailers, semi-trailers + Other transport equipment	10.0	8.0	8.9	10.7	11.6
36	Furniture; manufacturing n.e.c.	3.8	3.4	3.5	3.3	3.2
D	*TOTAL MANUFACTURING*	*100*	*100*	*100*	*100*	*100*

Note: * percentage shares of real value added of the manufacturing industry.

Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

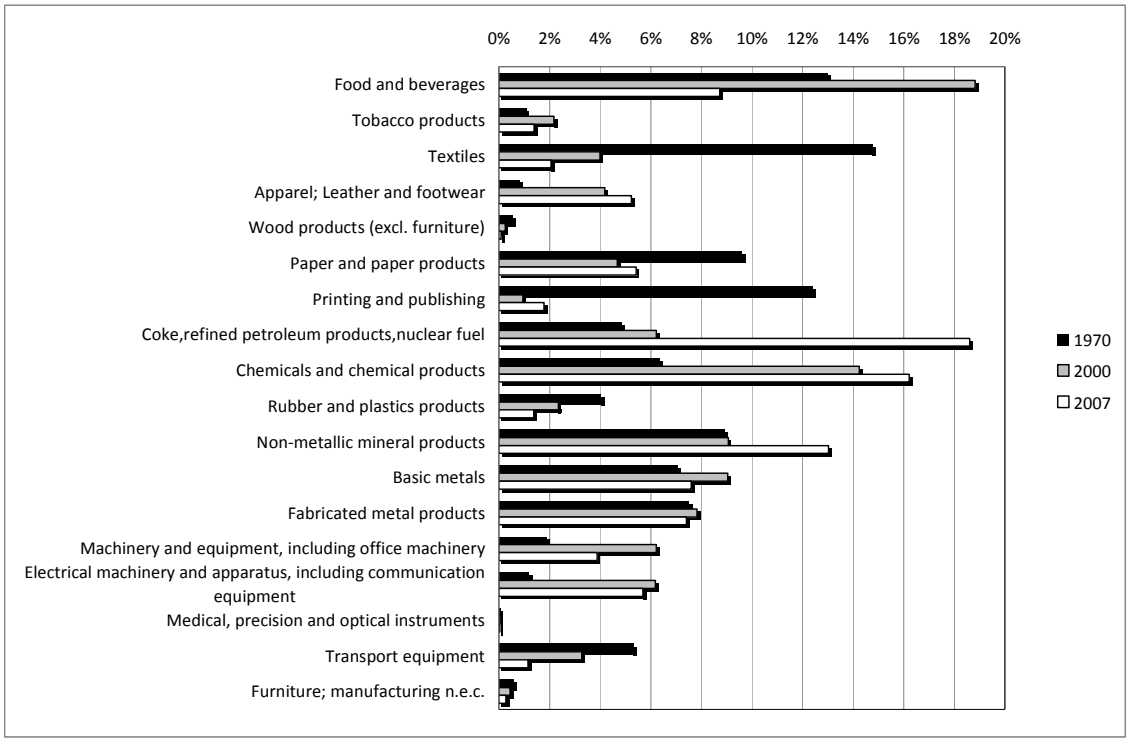
3.1 National patterns of manufacturing specialisation

Africa

The industrial structure of the African countries in our database is dominated by resource-based and traditional productions, such as food, apparel, leather and footwear, paper products, coke and refined petroleum products, metallic and non-metallic minerals. It is important to note that downstream industries directly related to some of these resource-based products, such as fabricated metal products and printing and publishing, are less important than in other regional groupings. This may be indicative that these countries have not diversified their industrial structure by exploiting vertical complementarities in value chains.

The Egyptian industry has progressively reinforced its relative specialisation in refined petroleum products, chemical products and non-metallic mineral products. In the period 1970-2000, this trend was accompanied by a growth in the real value-added shares of food industry and other traditional productions, and of machinery and electrical industries, but in the most recent period there was a reversal in these trends, and the Egyptian industry specialised in a narrower group of industries (Figure 3).

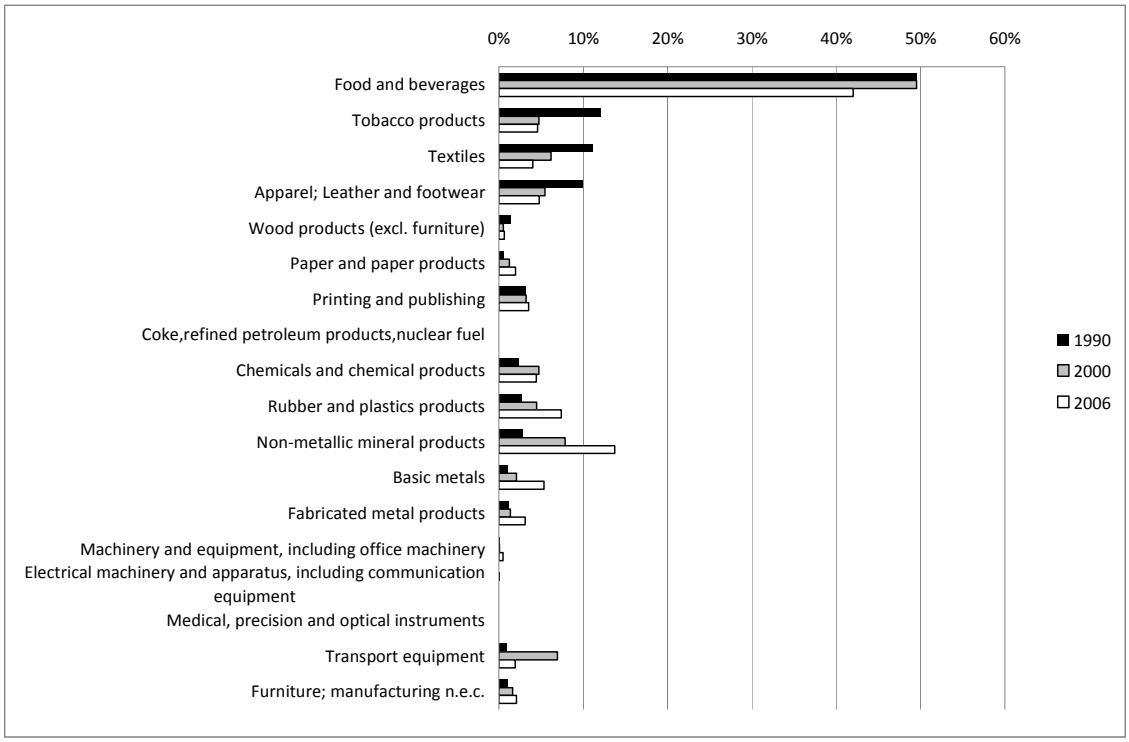
Figure 3 Egypt: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The structure of the manufacturing industry in Ethiopia appears fairly simple and strongly concentrated in a few traditional industries (food, beverages and tobacco; textiles; apparel, leather and footwear) (Figure 4). But in the last few years the value-added shares of these industries have fallen, and a certain degree of industrial diversification emerged with the growth of industries such as rubber and plastics, non-metallic mineral products and basic metals.

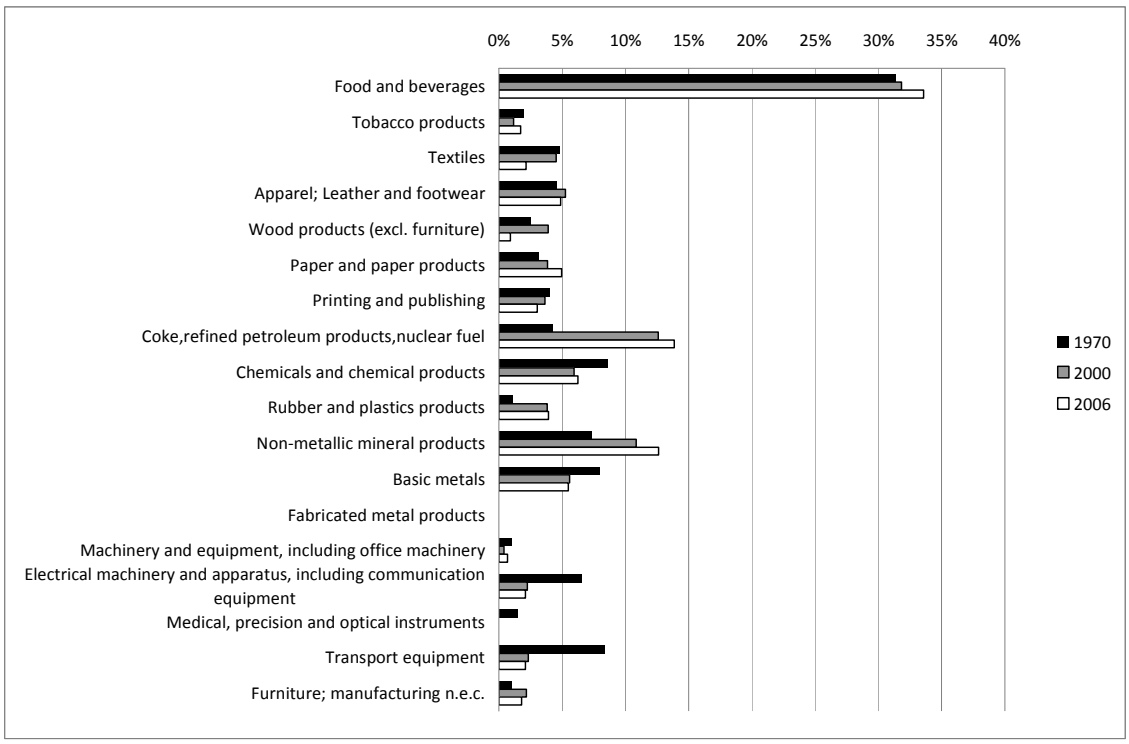
Figure 4 Ethiopia: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

For Kenya, data on value added is available only in current prices, which makes the results sensitive to changes in the relative prices of resource-based products. The dominant role of the food and beverage industry was further reinforced in the last few years. Surges have also been recorded by coke, refined petroleum, and by non-metallic mineral products throughout the period. Conversely, the importance of traditional industries, such as textiles and wood products, dropped in the most recent years (Figure 5).

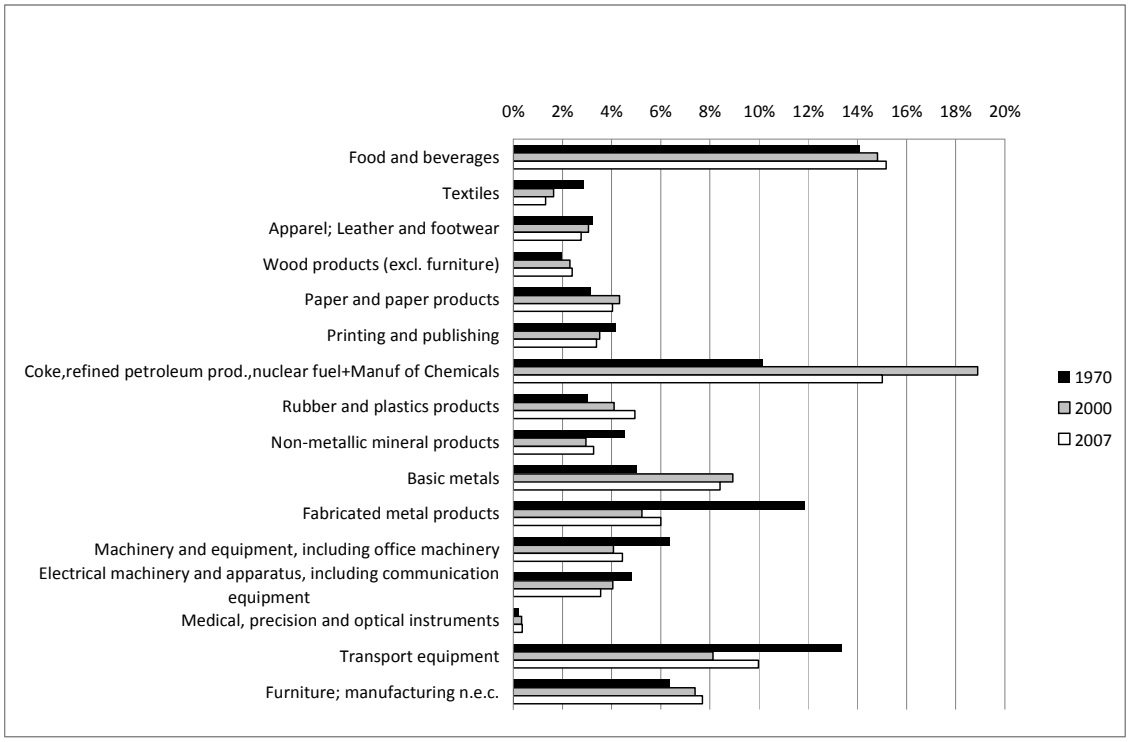
Figure 5 Kenya: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The South African manufacturing sector is characterised by a fairly strong food industry, with a rising real value-added share in the period 1970-2007; specialisation in the coke, refined petroleum products and chemicals, but with decreasing shares in the period 2000-07; specialisation in basic metals and the apparel-leather-footwear industries, with their shares declining slightly in the last years. A fairly large and rising share is recorded also for the residual group of furniture and manufacturing not elsewhere classified (n.e.c.), which also includes jewellery. Transport equipment is another important sector, which regained part of its previous large loss between 2000 and 2007 (Figure 6).

Figure 6 South Africa: Structure of the manufacturing industry

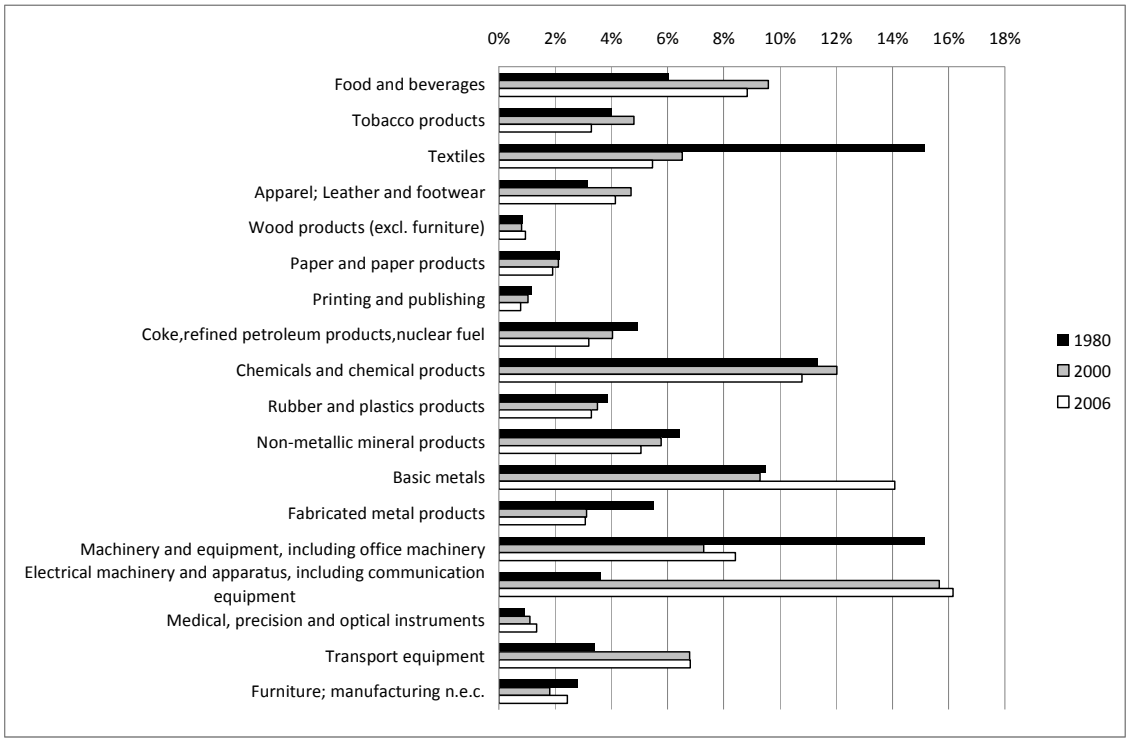


Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Asia

The Asian economies in our group of countries are characterised by different development levels and economic structures, making it difficult to identify significant common features. For China, value-added data are available only in current prices for the period 1980-2006 (Figure 7). Its industrial structure over this period is characterised by a strong decline of textile and other traditional industries and the 'heavy' industries producing metals and machinery, to the advantage of the electrical and telecommunication industry, transport equipment, food and beverages, apparel, leather and footwear. The Chinese industry has moved from the intermediate to the final stages of production processes, to better perform its role of global supplier of labour-intensive manufactured consumption goods. In the period 2000-2006, slightly different trends are observed, with a strong rise of the basic metal industry (possibly due also to the rise in its relative prices) and a partial recovery of the machinery sector, to the expense of traditional productions and chemicals. The share of the electrical and telecommunication industry continued to rise, reaching 16 per cent of total value added in 2006.

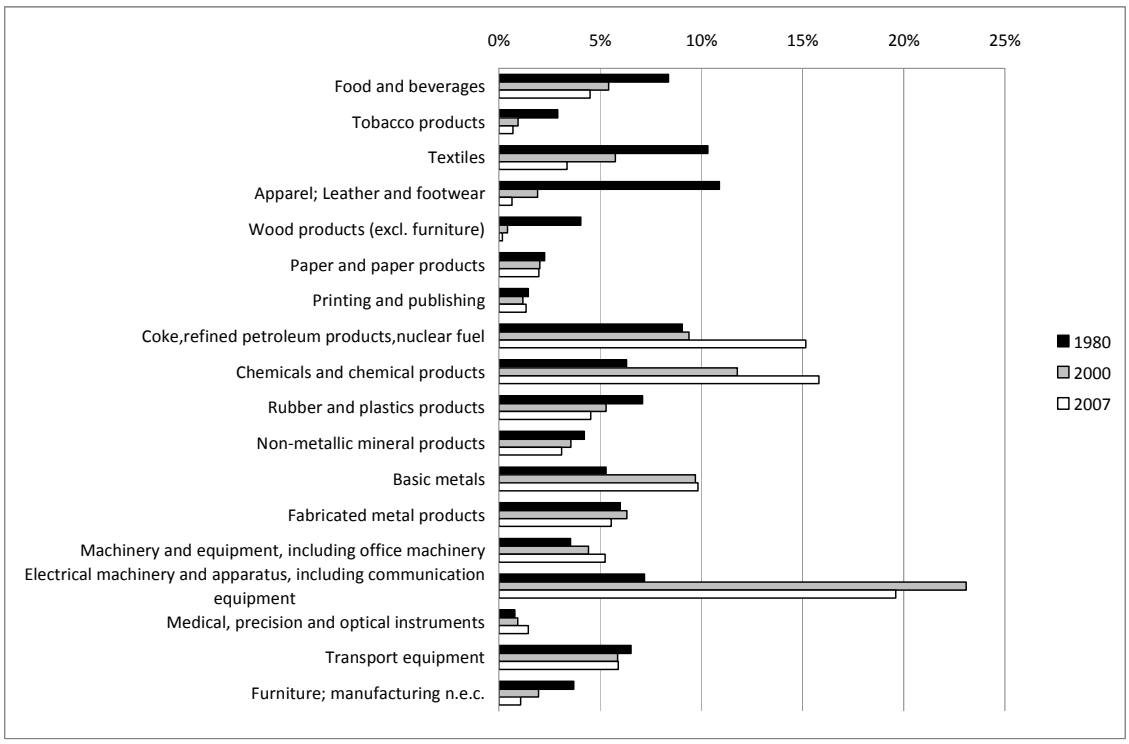
Figure 7 China: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009, GDP.

In the period 1980-2000, the Taiwanese industrial structure was dominated by the rise of consumption electronics, at the expense of most traditional industries (Figure 8), but significant specialisations already existed or strengthened also in basic metals, chemical and petrochemical products. The last two industries continued to expand their real value-added shares in the period 2000-2007, as a counterpart to the further decline of traditional sectors and a relative downsizing of the electronic industry.

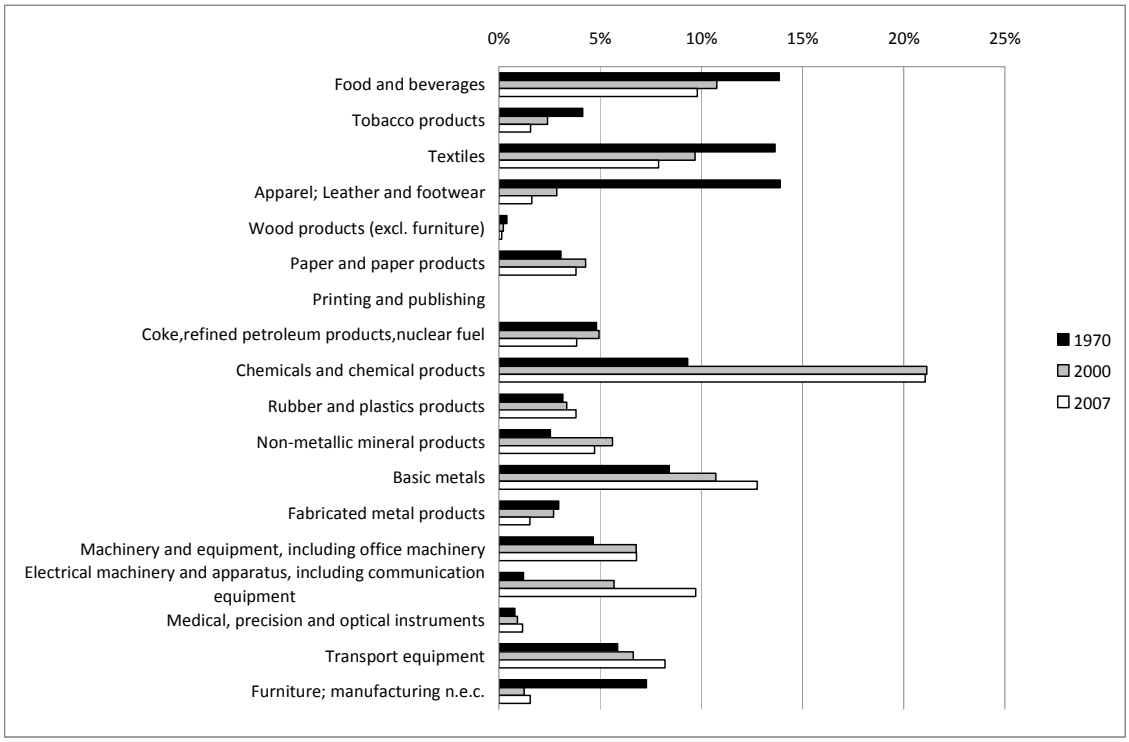
Figure 8 Taiwan Province of China: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009 (basis 1995).

The slow modernisation of the Indian economy is clearly visible in Figure 9, where all traditional industries show a downward trend in real value-added shares between 1970 and 2007, to the advantage of chemicals and non-metallic mineral products (until 2000), and basic metals. Also new industries, such as machinery, ICT and transport equipment, have emerged, but their real value-added shares remain fairly low relative to the rest of the world.

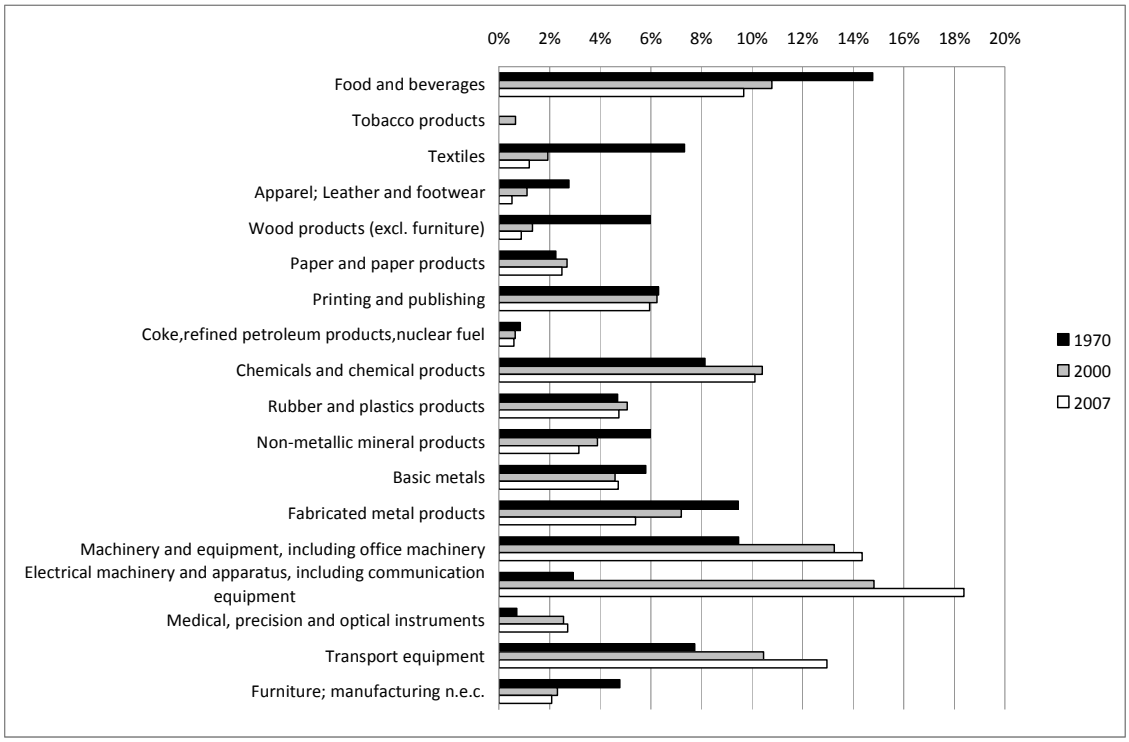
Figure 9 India: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Structural change in the Japanese industry has followed consistent patterns throughout the period under observation (Figure 10). Machinery, electronics, telecommunications and transport equipment have progressively emerged as the main specialisation sectors, at the expense of all traditional productions. In the period 2000-07, no other industries have significantly expanded their value-added shares.

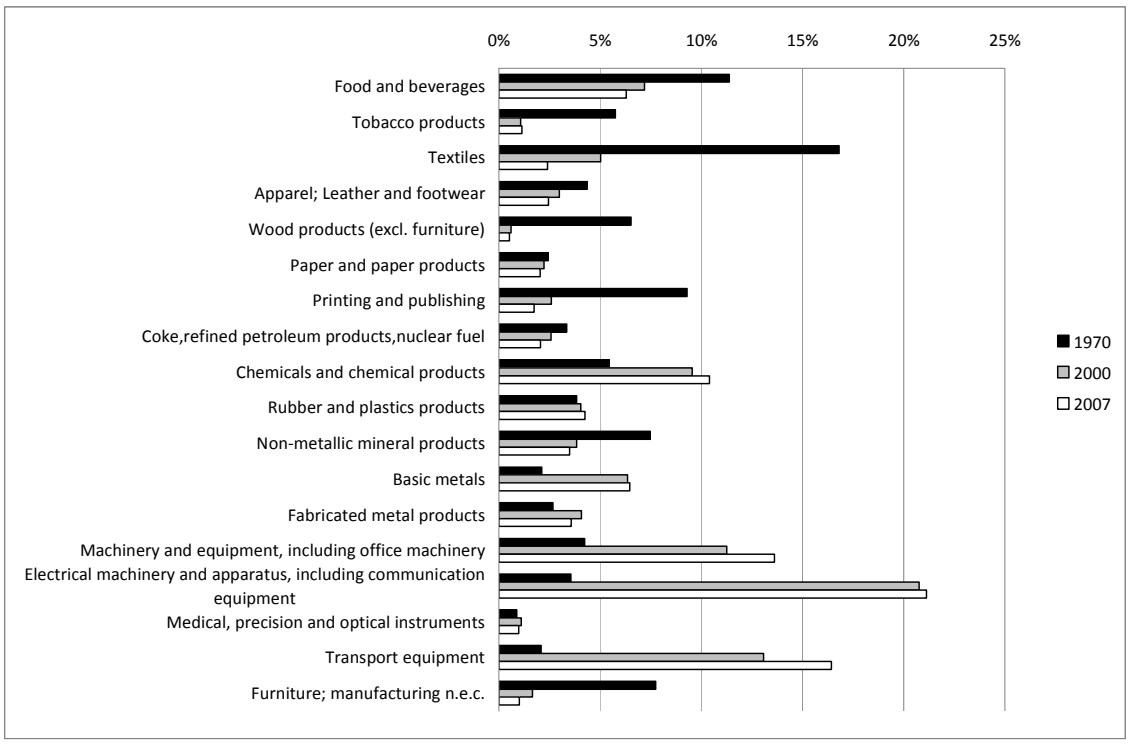
Figure 10 Japan: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Patterns similar to those described for Japan emerged in the Republic of Korea (Figure 11). Its economy has gradually intensified its specialisation in machinery, electronics, telecommunications and transport equipment, by cutting the shares of traditional sectors. But textiles, apparel, leather and footwear remain more important for the Republic of Korea's industry than for the other countries in our benchmark. No significant changes within these long-term trends have emerged in the last decade.

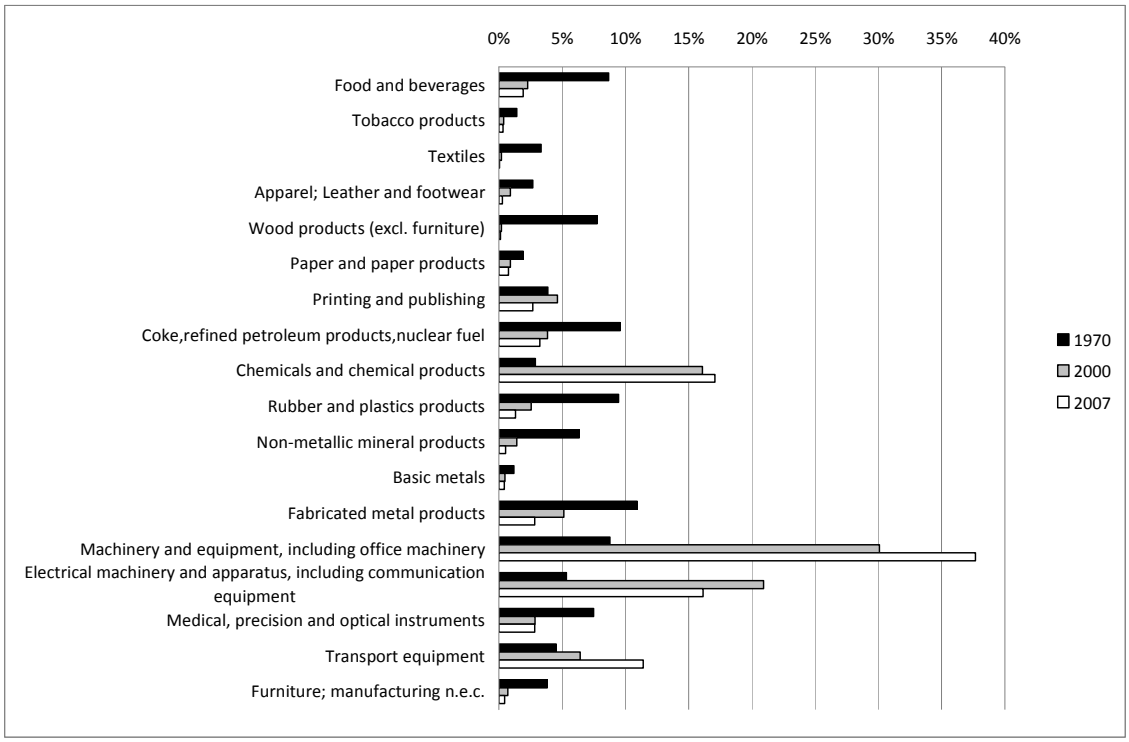
Figure 11 Republic of Korea: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The industrial structure of Singapore's economy has concentrated in few key activities (Figure 12). The mechanical group including office machinery reached a real value-added share of 38 per cent in 2007, starting from 9 per cent in 1970. The other industries of relative specialisation are chemical and petrochemical products, electrical machinery and communication equipment, although the last group's importance has slightly decreased in the period 2000-07. All the other industries, except transport equipment, have seen a fall of their real value shares in both of the sub-periods considered here.

Figure 12 Singapore: Structure of the manufacturing industry



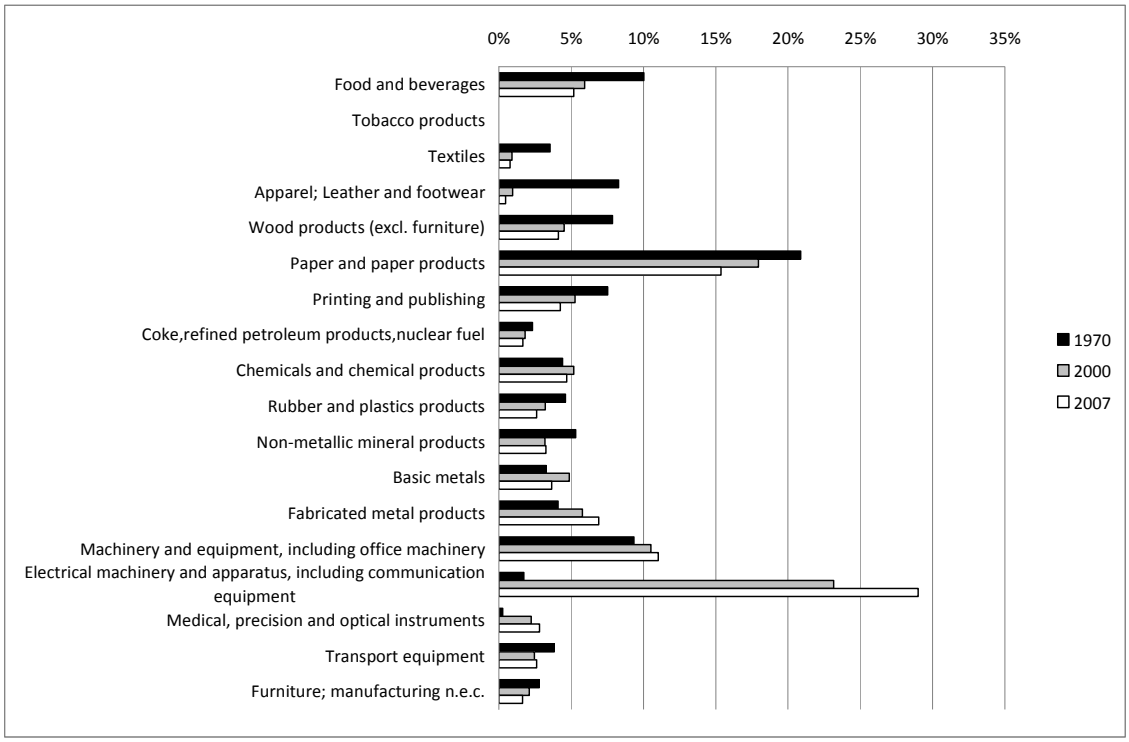
Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Europe

Our database contains several European countries, including some members of the European Union and important external countries, such as Russia and Turkey. But some limitations of the available data, the great diversity among the economies in our sample, and the lack of statistics on large economies such as Germany do not allow for making any significant generalisations about the region.

The Finland case is unusual for the intensity of its structural change. The electrical and communication equipment industry, which was very small in 1970, has reached a real value-added share of almost 30 per cent in 2007. Most of its growth occurred in the Nineties, driven by the boom of mobile phones, but has remained rapid in the last decade. Wood and paper products are still more important than in the rest of our sample, but their shares have shrunk substantially. Large decreases have been recorded also for other traditional products such as apparel, leather and footwear (Figure 13).

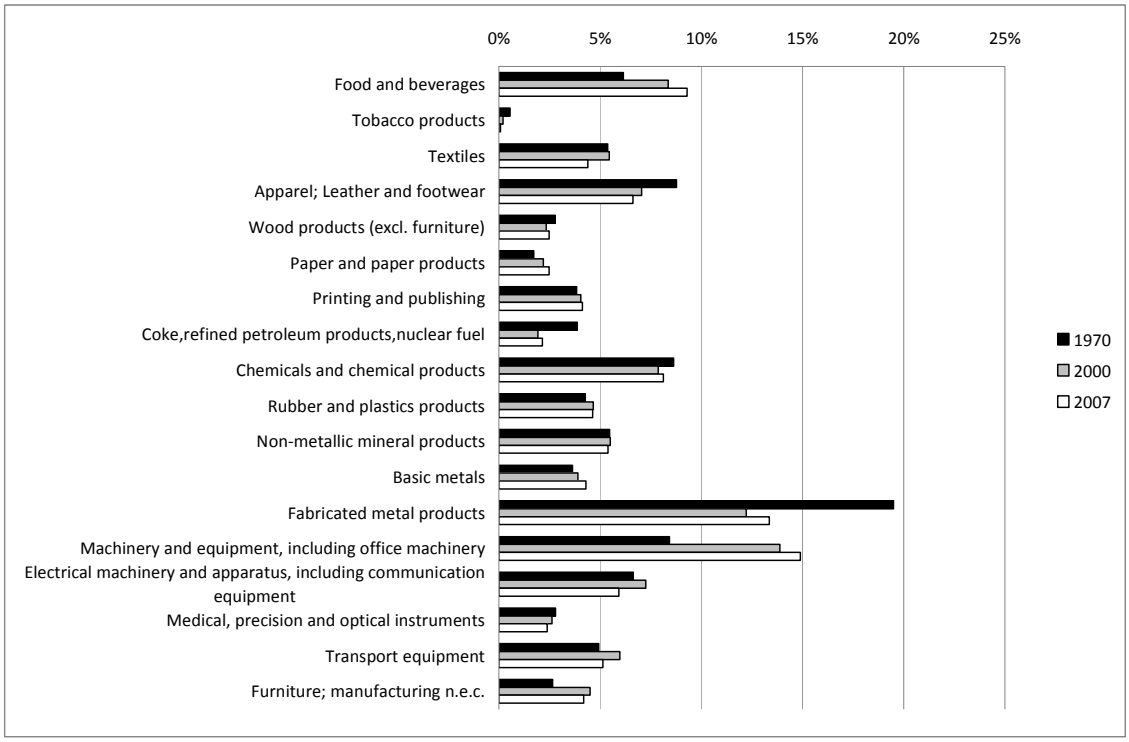
Figure 13 Finland: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The structure of the Italian manufacturing industry is peculiar relative to most other developed countries. The real value-added shares of traditional industries such as textiles, apparel, leather and footwear, although downsized, remained fairly higher than those in similar countries. However, industries such as machinery, food and beverages have consistently improved their shares, reflecting the evolution in Italy's comparative advantages. The period 1970-2000 was also characterised by a relative expansion of the transport equipment and furniture industries, as well as by a decline of fabricated metal products and, to a lesser extent, of the chemical and petrochemical industries. These trends were reversed in the following years (Figure 14).

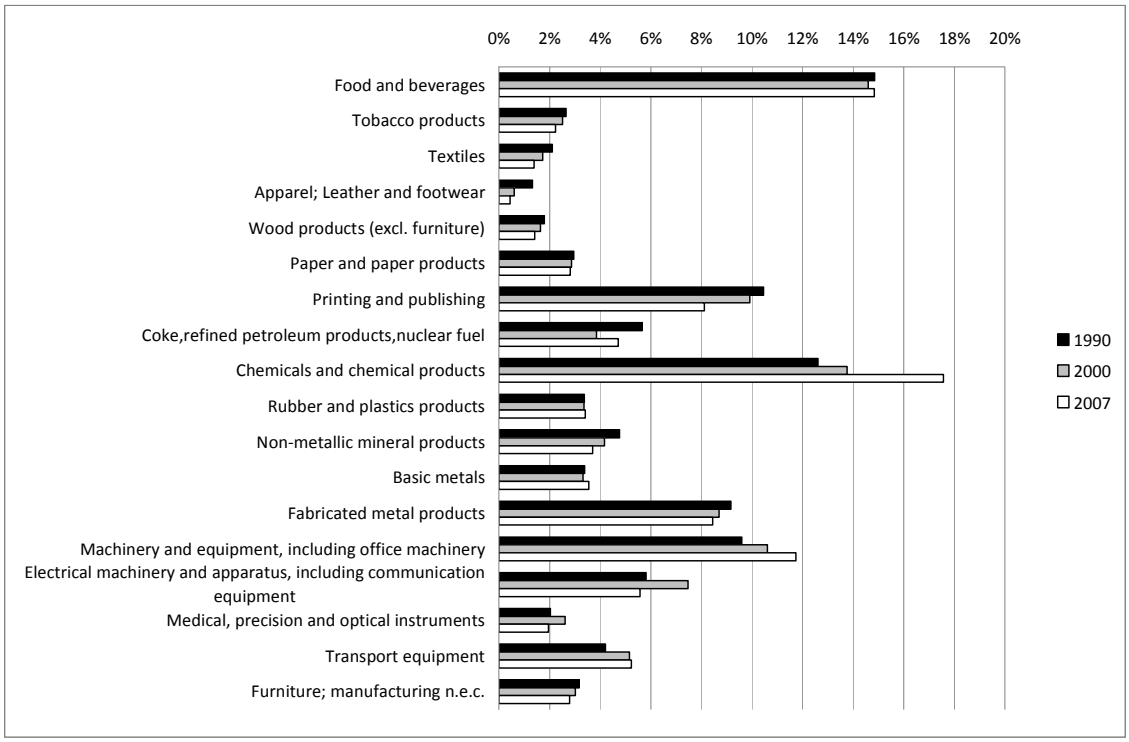
Figure 14 Italy: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Consistent data for the Netherlands is available only since 1990, and does not show large changes in the last two decades. In comparison with the average of our sample, the Netherlands' manufacturing sector shows a significant specialisation in food, beverage and tobacco industries, printing and publishing, petrochemicals, chemicals, and fabricated metal products. Most of these industries have slightly decreased their importance in the period 1990-2007, except chemical products. In the meanwhile, the machinery grouping has recorded a significant rise (Figure 15).

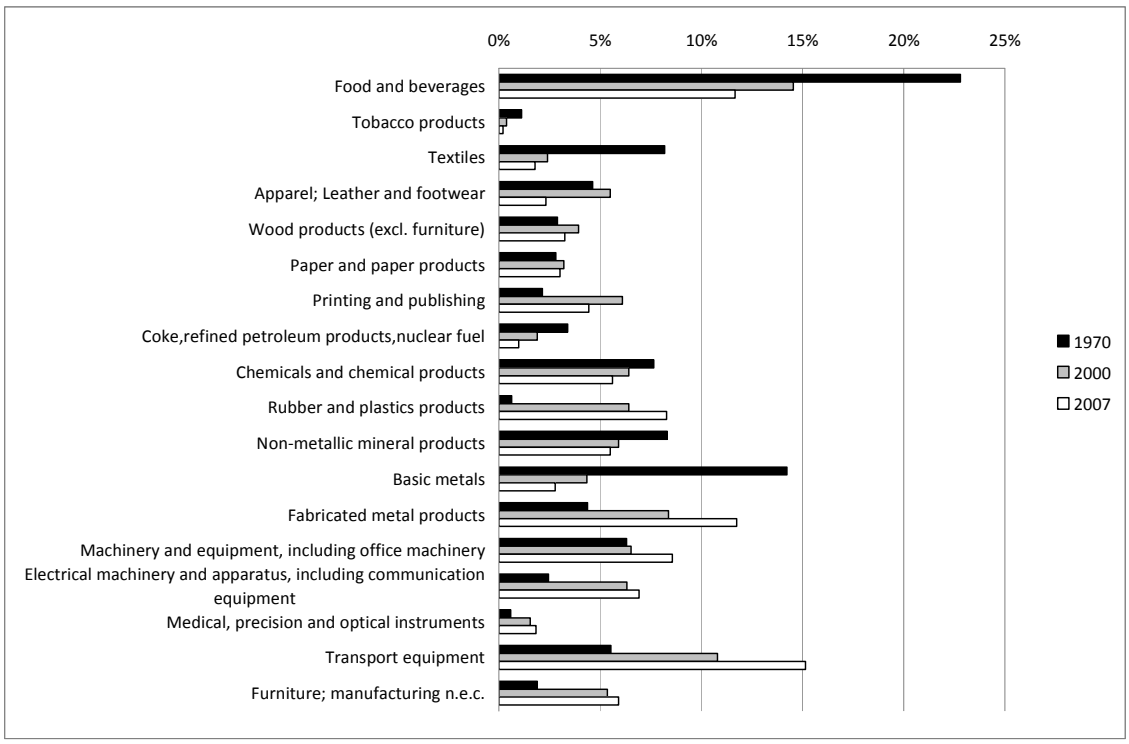
Figure 15 Netherlands: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The Polish manufacturing industry appears fairly diversified (Figure 16). Its main specialisation sectors include apparel, leather and footwear, wood products, rubber and plastics, non-metallic minerals, fabricated metals, and transport equipment. The last sector has recorded the largest increase in the real value-added share between 2000 and 2007, followed by fabricated metals, machinery, and rubber and plastics. The relative importance of most traditional and resource-based industries, such as basic metals, has fallen.

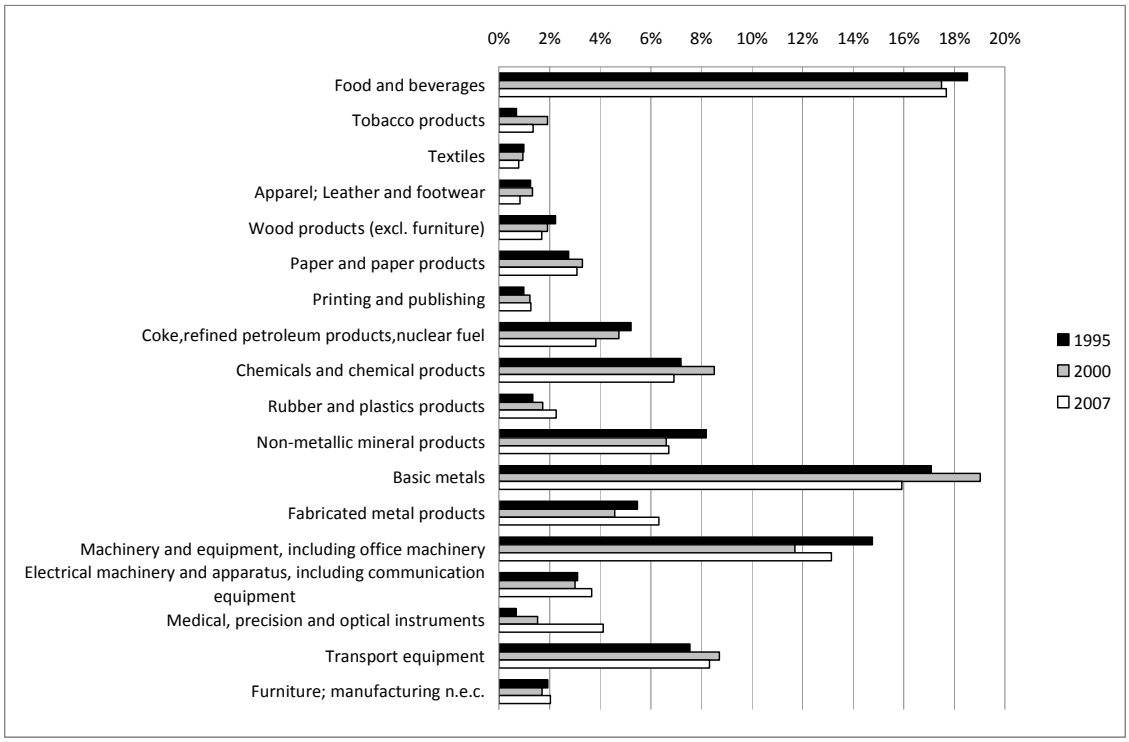
Figure 16 Poland: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009, data for 2000 is from 2001.

Real value-added data for the Russian economy is available only for the period 1995-2007 and show the relative stability of its manufacturing structure after the transition to the market economy. The main industries of specialisation remain basic metals, non-metallic mineral products, energy sources, and to a lesser extent, the food sector. In the most recent period, there are some signs of diversification, with a growth of the real value-added shares of fabricated metal products, machinery and precision instruments, mostly at the expense of basic metals, chemicals and energy sources (Figure 17).

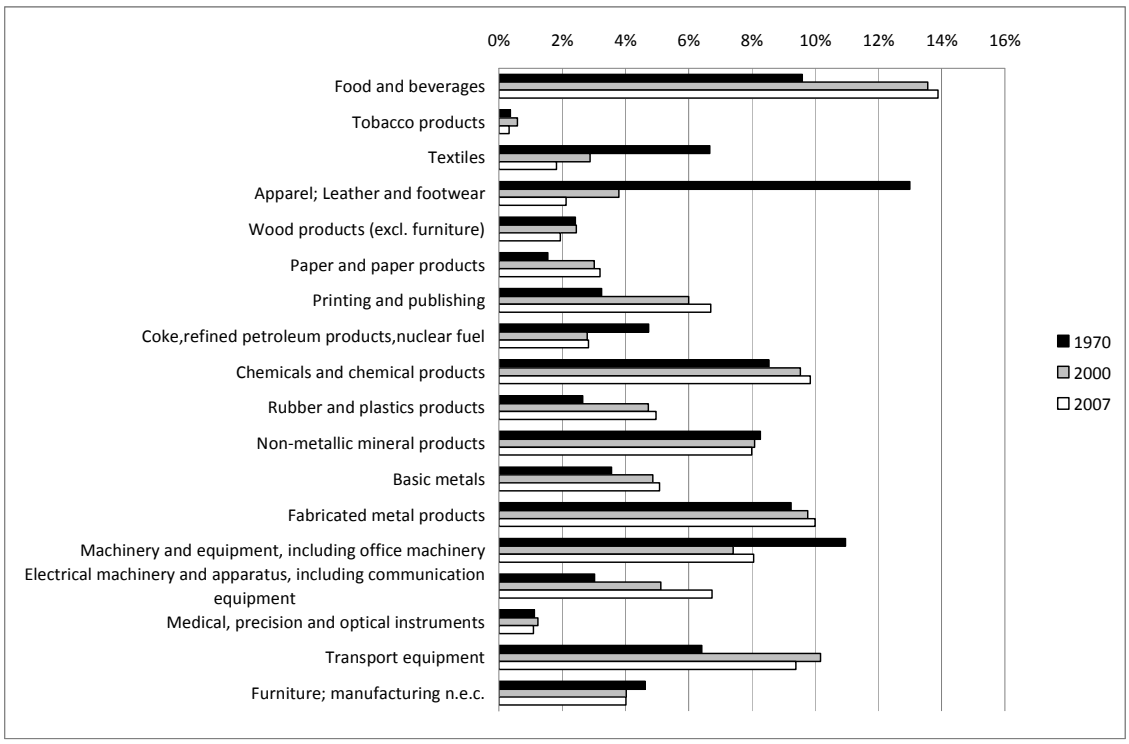
Figure 17 Russia: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The Spanish manufacturing industry has remained oriented toward traditional productions despite the large falls recorded by the real value-added shares of textiles, apparel, leather and footwear. Relative to our benchmark non-metallic mineral products still play a prominent role. Recent changes include a further expansion of the electrical machinery and communication equipment grouping,, which however remains fairly smaller than in the average of our sample (Figure 18).

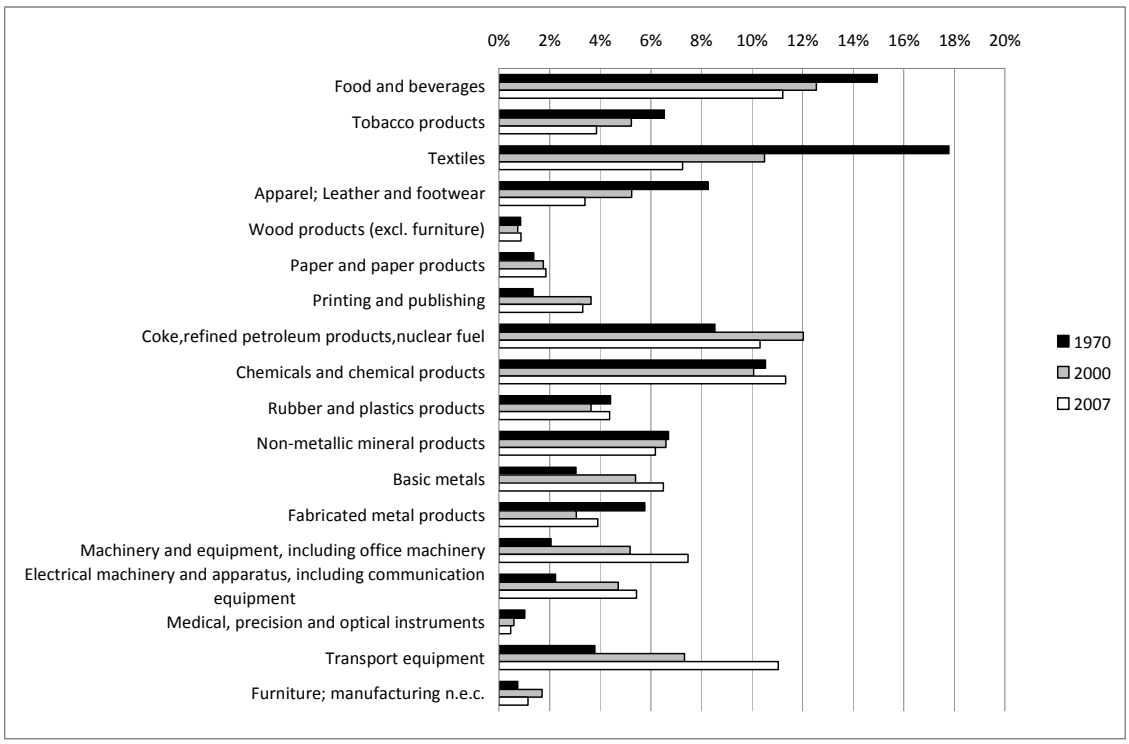
Figure 18 Spain: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Turkey is an example of the deep structural changes occurring in the manufacturing structure of emerging economies as a result of their integration into world markets (Figure 19). Even though traditional and resource-based productions remain much more important than in the average of our sample, their real value-added shares have undergone substantial cuts in the entire period under observation (with the exception of basic metals). The speed of this process has accelerated in the most recent years. These structural shifts have favoured new industries such as transport equipment and machinery. Having started from low levels, the importance of these industries is now not much smaller than in the average of our sample.

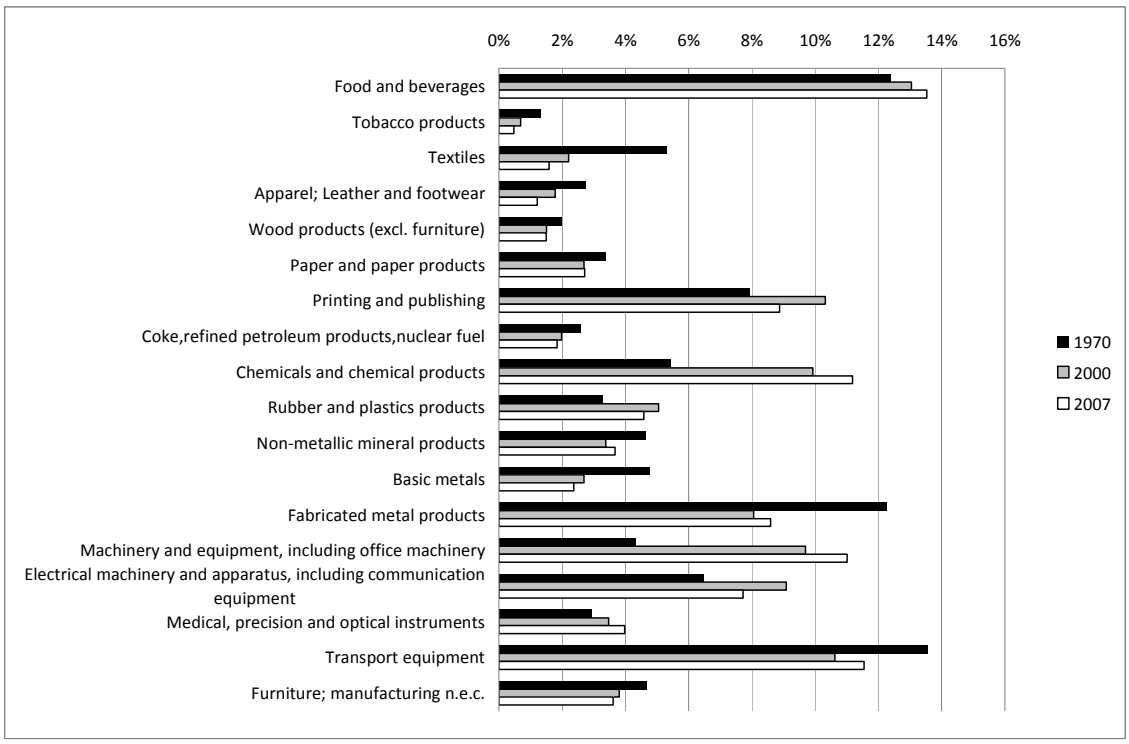
Figure 19 Turkey: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The structure of the British industry does not show large differences from our benchmark. The only sector of remarkable specialisation is the printing and publishing industry. However, in the last seven years its relative weight has shrunk even more than for other traditional productions. Emerging industries, throughout the period 1970-2007, are chemicals, machinery, precision instruments and food. The transport equipment sector has recovered recently part of its previous losses (Figure 20).

Figure 20 United Kingdom: Structure of the manufacturing industry



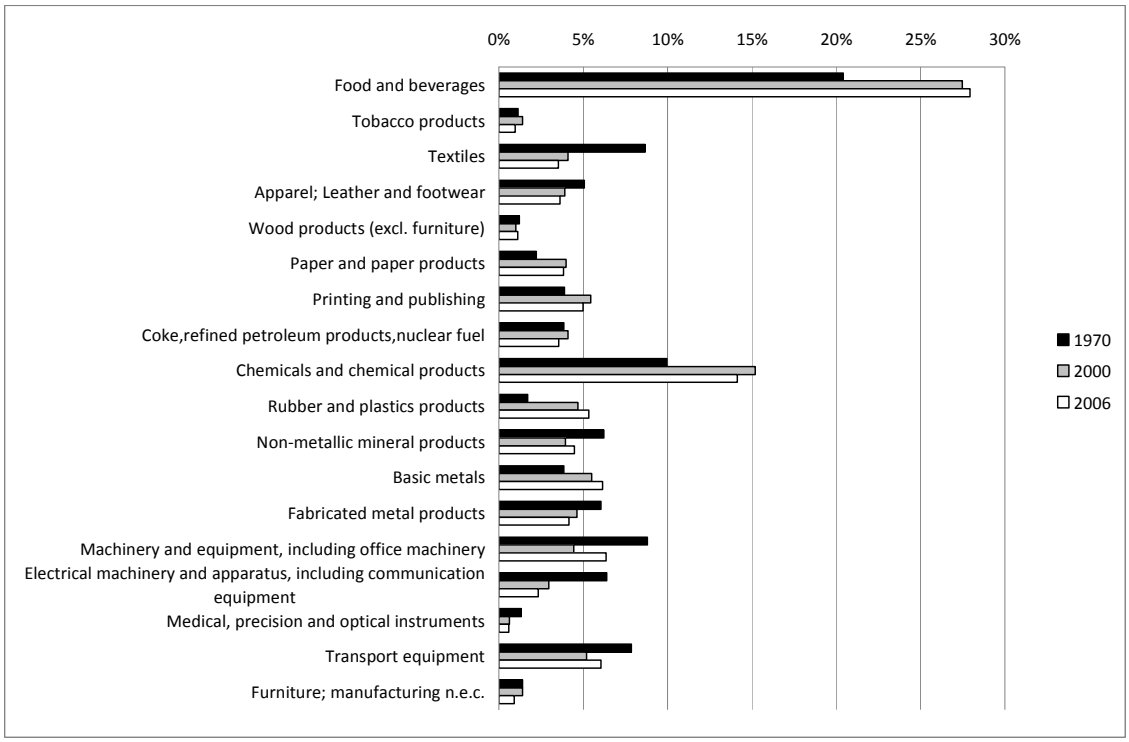
Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Latin America

The three largest Latin American countries are in our database and show a relative stability of their traditional specialisation patterns, even if some national peculiarities are also evident and tend to emerge more clearly in the most recent years.

The structure of the manufacturing industry in Argentina is fairly concentrated in a small number of activities. Food, textiles and clothing, leather and footwear still emerge as the most important ones. Unlike other traditional industries, the food sector has expanded considerably in the period 1970-2000, with chemicals, rubber and plastics products, and at the expense of most modern industries. New trends have also emerged in the period 2000-06, with a recovery of machinery and transport equipment (Figure 21).

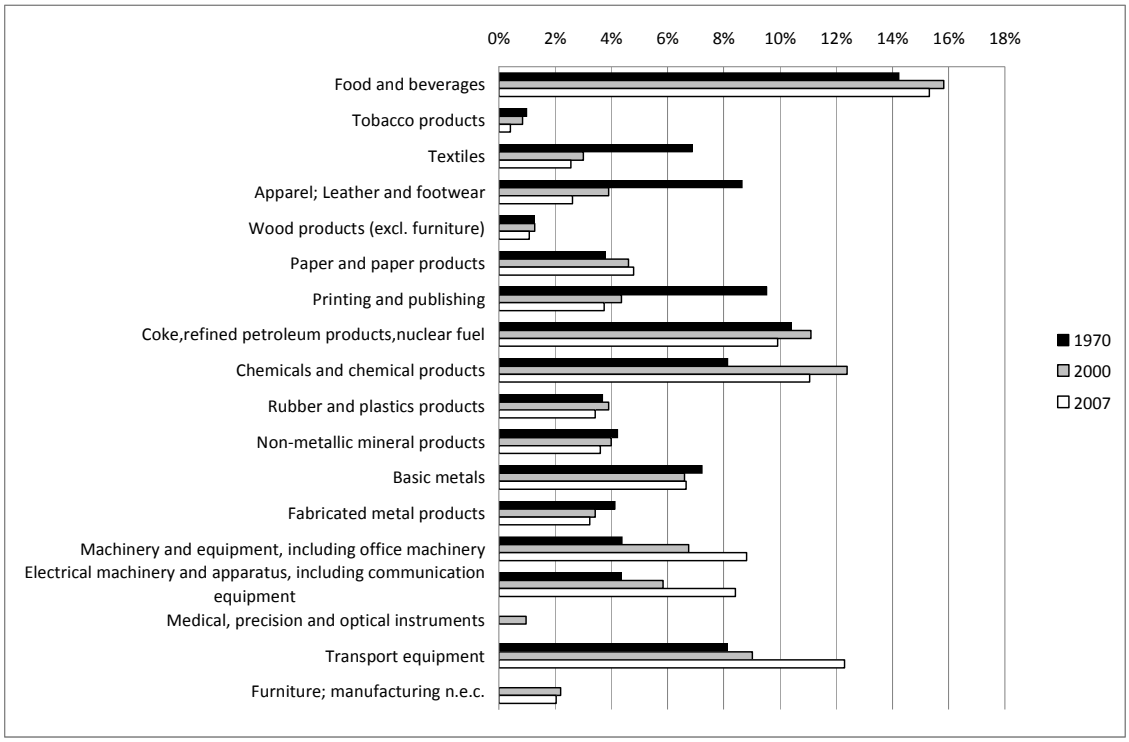
Figure 21 Argentina: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Comparing the structure of the Brazilian manufacturing industry with our sample's average, petrochemicals and, to a lesser extent, the apparel, leather and footwear industries emerge as the sectors of relative specialisation. A trend toward a downsizing of most traditional industries is visible in the long run, but in the period 2000-07 only machinery, ICT groupings and transport equipment have continued to expand, at the expense of all other industries (Figure 22).

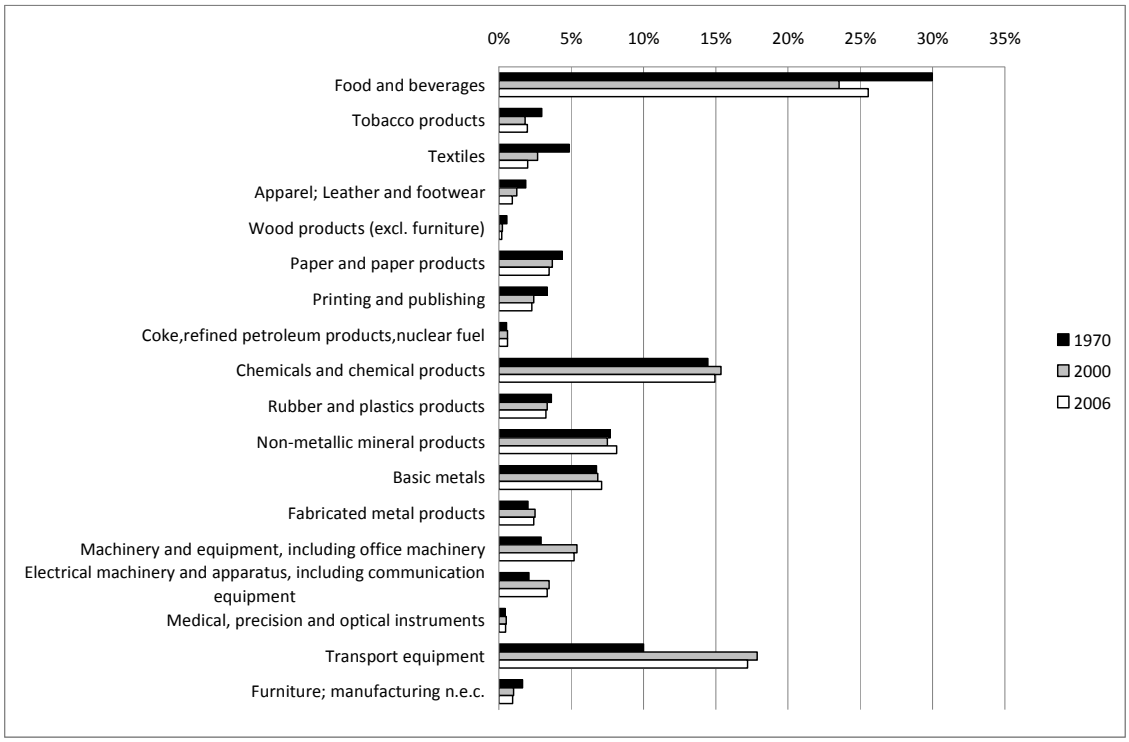
Figure 22 Brazil: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The structure of the Mexican manufacturing industry looks concentrated in a small number of sectors, including food, beverages and tobacco, non-metallic minerals, basic metals and, to a lesser extent, transport equipment. Although the period 1970-2000 was characterised by a decline of all traditional industries to the benefit of transport equipment and mechanical and electrical industries, the most recent years have been more stable. Only the food industry has significantly raised its share of real value added, at the expense of most of the other industries (Figure 23).

Figure 23 Mexico: Structure of the manufacturing industry

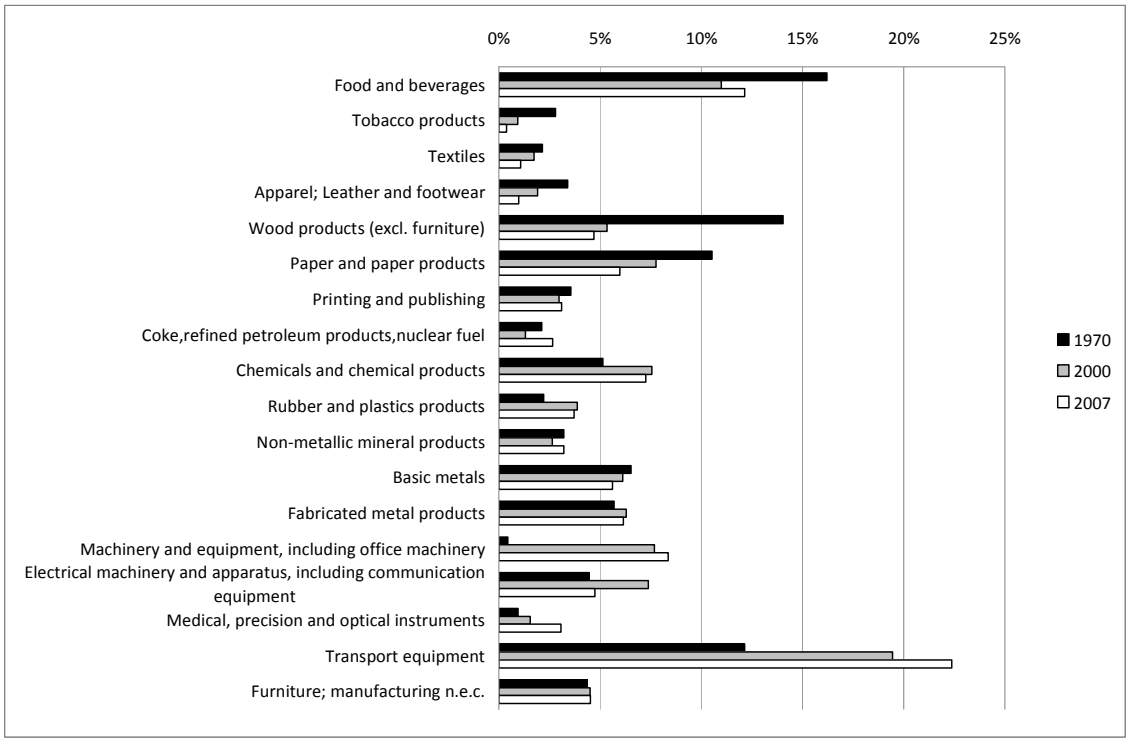


Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

North America

The structure of the Canadian manufacturing industry is clearly dominated by the transport equipment sector, which has considerably expanded its real value-added share in the periods shown in Figure 24. Other relative specialisation sectors include wood and paper products, but their importance has been shrinking in the last decades, following a pattern shared by all traditional industries. The period 2000-07 was also characterised by a further rise of precision instruments and machinery, and by a recovery of the food industry and energy products, at the expense not only of traditional sectors, but also of electrical machinery and communication equipment.

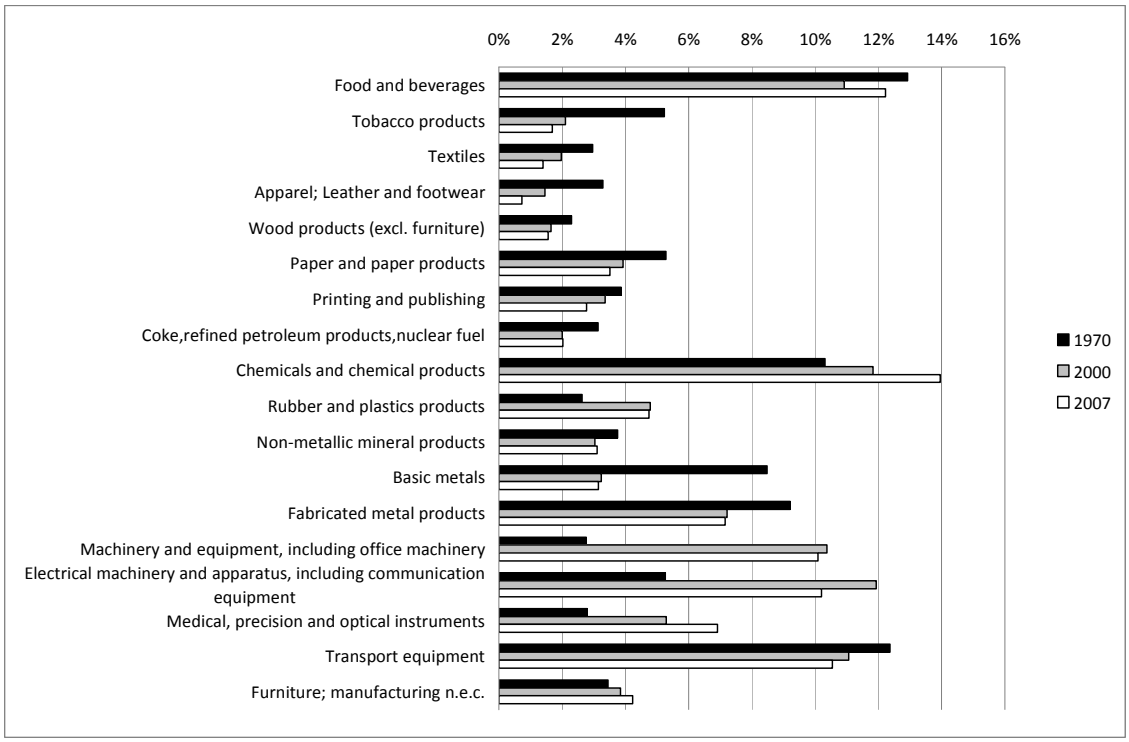
Figure 24 Canada: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

The direction of structural changes in the US manufacturing industry was clear over the last three decades: all traditional sectors and resource-based industries cut their shares of real value added, to the advantage of the chemical industry, rubber and plastics products, machinery, ICT and precision instruments (Figure 25). These trends were partly reversed in the 2000-07 period. Industries that expanded significantly their shares were food, chemicals and precision instruments, at the expense of a further fall of traditional industries, and downsizing of machinery, ICT and transport equipment, which were prompted by the process of international production fragmentation. With all these changes, precision instruments emerged as the most important sector in terms of relative specialisation for the US industry.

Figure 25 United States of America: Structure of the manufacturing industry

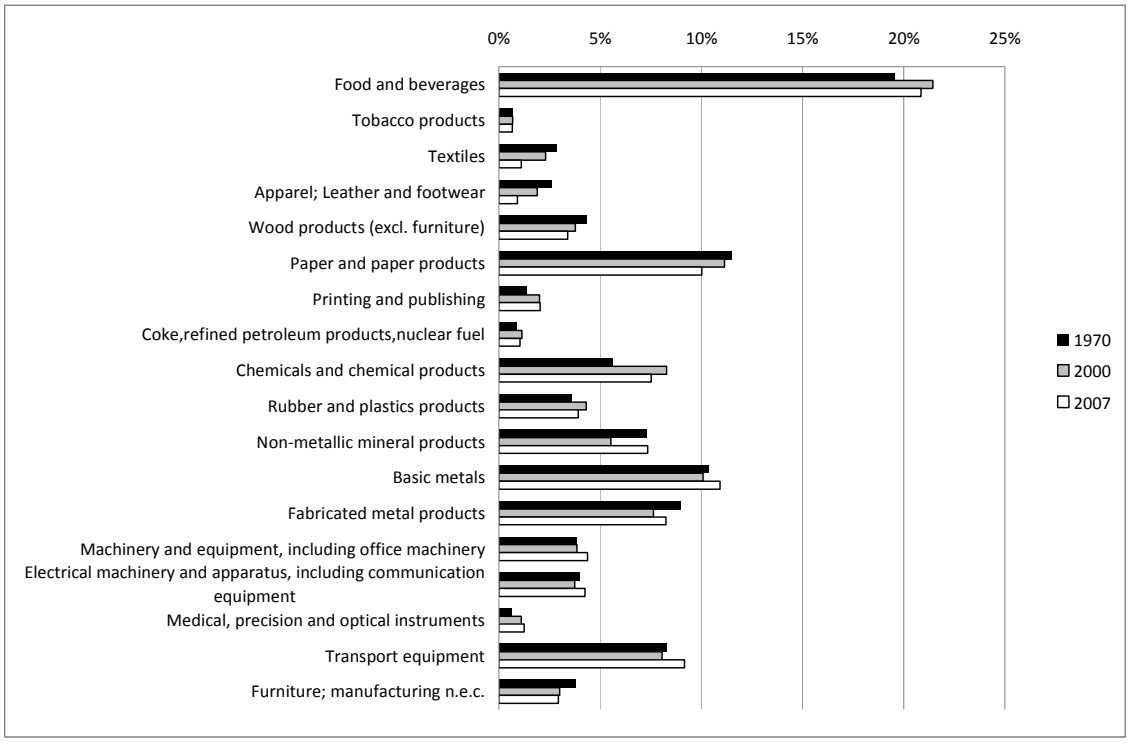


Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

Oceania

Australia's manufacturing industry is strongly oriented toward resource-based activities, with wood and paper products, non-metallic minerals, metals and the food industry emerging as the most important sectors of relative specialisation (Figure 26). Structural changes were of moderate intensity throughout the observed period, but the most recent years witnessed an expansion of the real value-added shares of minerals and metals and new industries, such as machinery and transport equipment.

Figure 26 Australia: Structure of the manufacturing industry



Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

3.2 The intensity of structural change and specialisation in national manufacturing patterns

To better assess the structural change process sketched in section 3.1, and to study its impact on growth rates differences, it is instructive to measure its intensity. Several statistical methods can be used for this purpose, ranging from simple descriptive indicators, such as the Lilien index (Lilien, 1982) to complex econometric techniques, such as non-parametric methods aimed at gauging the dynamics of overall specialisation (De Benedictis and Tamberi, 2004).

As a first step in our research programme, we will use a simple statistical indicator, which proves flexible for comparisons among different distributions over time and across countries,

namely the Finger-Kreinin dissimilarity index (Finger and Kreinin, 1979). This index ranges between zero (equality) and one (maximum dissimilarity) and measures how much a given distribution (*a*) differs from a chosen benchmark (*b*). Its formula is as follows:

$$D = 1/2 \sum_{i=1}^{n} |a_i - b_i|$$

where a_i and b_i denote the share of sector *i* in each of the two distributions.

When a given distribution at a given time is compared to the same distribution in a previous period, the *D* index can be used as a simple measure of structural change. Table 2 shows the results obtained by applying the *D* index to the distribution of manufacturing value-added in selected countries for four different periods. Since the last period is shorter than the previous ones, the corresponding figures cannot be directly compared. A proportional adjustment is however problematic, because it implies the arbitrary assumption that the intensity of structural change grows linearly with the number of years.

Countries were ranked according to the index values in the period 2000-06, and their ranking changes significantly over time. Some regularities can however be identified. On average, the intensity of structural change was fairly high in the 1970s and slowed down in the 1980s. The 1990s were characterised by a higher rate of instability, which is visible also in the 2000-06 period, once controlling for the different number of years.

Small developing economies, particularly in Africa, tend to show higher indices of structural change, often denoting the volatility of their specialisation patterns. Some Asian economies, such as Singapore and South Korea, after showing deep structural changes in the Seventies, have displayed more stable specialisation patterns, but the opposite occurs for other countries, even in the Asian region. Specific significant national cases, already mentioned in section 3.1, are clearly visible in the table. For example, Finland shows the highest index of structural change in the 1990s, due to the sharp growth of its communication industry. The structure of the manufacturing industry has changed rapidly also in Poland and Russia in the Nineties, as an effect of the transition process. Southern European and Latin American countries (except Argentina) tend to show more stability, which has sometimes been interpreted as a sign of their difficulty to adjust to changes in the international economy.

Table 2 Finger-Kreinin index of structural change in the manufacturing industry, 1970-2006

	1970-80	1980-90	1990-00	2000-06
Egypt	26.6	20.0	14.3	19.7
Ethiopia	n.a	n.a	17.7	15.8
Kenya	11.5	10.2	21.9	7.2
South Africa	10.0	10.5	5.6	5.2
China (Taiwan)	n.a	15.2	18.3	11.3
Singapore	33.0	13.6	12.2	10.7
India	8.0	12.5	10.8	7.8
China	n.a	12.2	14.3	7.4
Republic of Korea	20.7	21.0	17.7	6.6
Japan	7.8	12.0	9.1	6.3
Poland	10.1	11.2	20.1	11.0
Turkey	19.2	12.2	11.2	8.4
Russia	n.a	n.a	n.a*	6.7
Netherlands	n.a	n.a	5.4	6.0
Finland	6.5	7.9	23.2	5.6
United Kingdom	12.4	5.7	6.4	5.0
Italy	6.5	6.0	5.4	4.8
Spain	12.7	5.9	8.0	4.4
Brazil	11.4	8.9	5.5	6.4
Argentina	7.5	15.1	13.6	5.1
Mexico	8.8	3.7	8.1	3.1
Canada	5.6	10.1	9.6	7.4
United States of America	17.6	7.7	6.4	5.1
Australia	4.7	3.3	4.8	4.5
Average	*12.7*	*10.7*	*11.7*	*7.6*
Average / number of years	*1.3*	*1.1*	*1.2*	*1.3*

Note: *The F-K index for Russia was 7.75 in the period 1995-2000.

Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

A second possible use of the Finger-Kreinin index is in the measure of relative concentration of a given distribution. The methodological literature on concentration indices is rich and many alternative indicators are available. Some of them, however, such as the widely used Herfindahl index, are based on a comparison with an equi-distribution benchmark, which is clearly inappropriate for distributions across observation units, such as countries or sectors, characterized by intrinsically different sizes. This is why *relative* concentration indicators are required, comparing the distribution of interest to a proper benchmark.

Among the many available possibilities, we have chosen to compare each country's distribution of manufacturing value added to the average of our 30 countries benchmark, which is assumed to be the 'normal' distribution of production. Other things being equal, a higher dissimilarity with our benchmark distribution is assumed to reveal a higher concentration in patterns of specialisation. For any given benchmark distribution, the maximum *D* is reached when the distribution is concentrated only in one sector, which must be the smallest in the benchmark distribution.

Table 3 shows the results obtained by applying the *D* index to measure relative concentration for countries analysed in section 3.1, which were ranked according to their index levels in 2006. The ranking is influenced by country size so that, other things being equal, larger economies tend to be more similar to our benchmark, since this is computed as a size-weighted average of all countries.

The last row of the table shows an upward trend of the *D* indexes on average, since 1980. This can be interpreted as a sign of rising specialisation in national manufacturing patterns. This trend of structural divergence is strong in most African countries (except Ethiopia), in Argentina and in some Far Eastern economies, as well as in Finland and Italy. On the contrary, Russia, Turkey, North American and most Asian countries show a decrease in dissimilarity with our benchmark, which can be seen as a sign of structural convergence and lower specialisation.

Table 3 Finger-Kreinin index of relative concentration of the manufacturing industry, 1970-2006

	1970	1980	1990	2000	2006
Ethiopia	n.a	n.a	62.2	52.0	51.5
Kenya	25.3	29.9	35.3	45.5	47.3
Singapore	32.9	34.3	35.1	36.2	37.2
Egypt	29.4	29.0	28.1	29.7	37.1
Finland	33.1	28.6	28.6	29.9	32.8
China (Taiwan)	n.a	25.6	22.1	27.4	32.5
South Africa	20.1	26.2	31.2	34.4	31.8
Mexico	25.7	31.4	32.8	29.8	30.0
Australia	20.2	24.8	26.1	27.4	27.9
Argentina	20.0	13.5	25.4	27.3	26.7
India	29.0	29.9	27.8	28.6	24.9
Russia	n.a	n.a	46.6*	27.3	24.3
Italy	23.3	17.4	15.9	20.5	22.4
Poland	24.9	20.9	15.2	18.7	22.2
China	n.a	26.8	23.4	22.2	21.5
Turkey	32.7	33.0	30.0	28.5	21.3
Netherlands	n.a	n.a	17.6	16.4	20.2
Canada	18.7	24.0	18.8	19.5	19.8
Republic of Korea	30.2	24.6	19.8	17.4	18.8
Brazil	19.8	18.0	19.3	19.3	17.1
Spain	21.9	16.7	18.0	15.0	16.6
Japan	14.2	12.0	10.4	9.0	14.1
United Kingdom	13.4	11.9	9.5	10.5	11.8
United States of America	11.5	10.6	8.1	5.8	9.0
Average	*23.5*	*23.3*	*24.4*	*24.9*	*25.8*

Note: * Refers to 1995.

Source: UNIDO calculation based on UNIDO INDSTAT 2, 2009.

4. Conclusions

After surveying the theoretical and empirical literature on structural change, we presented a descriptive analysis of long-term trends and recent changes in the structure of the world economy. For a long time, the global process of tertiarisation was accompanied by rising industrial shares in total value added, but from 1970, tertiarisation coincided with relative downsizing of the manufacturing sector. Although this has been sometimes described as a "dangerous" *de-industrialisation* phenomenon, the most recent data show a setback of this process. In the period 2000-08 the share of services in world production has slightly shrunk, allowing for a partial recovery of industry and agriculture. It is too early however to ascertain

whether this recent trend is a temporary result of rising relative agricultural and mineral prices, or represents a more important change.

The inter-sectoral dynamics of world production has also changed economic geography, affecting the relative contribution of the main regions to global value added. Also in this case, recent data do not confirm the prevailing trends of the previous decades. In fact, the period 2000-08 has witnessed a sharp fall of North America's share of world production, and a cut of the Asian share, to the benefit of all the other regions, especially Europe. To a certain extent, these trends are affected by changes in relative prices and by fluctuations in nominal exchange rates that are stronger than substitution effects on tradable products. But the decomposition analysis carried out in this paper shows that a small contribution has come also from structural effects, resulting from the correlation between regional specialisation patterns and changes in the sector distribution of world production.

To better understand these changes, we presented a more detailed analysis of the sector structure of manufacturing value added in several significant developing and developed countries. Wherever possible, the analysis has been conducted in constant prices, to control for possible distortions caused by the recent rise in the relative price of raw materials.

In general, we might conclude that the intensity of structural change, after the relative slowdown in the 1980s, has risen again in the last two decades, especially in small developing economies, which are led towards further specialisation of their industrial structure.

In this paper we have described the main processes of structural change at global level. However, further research is still needed to assess the robustness of these preliminary conclusions and to investigate the global and local forces behind structural change. A deeper understanding of these forces has primary importance in defining the scope of national and regional industrial development policies.

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Annex

Table 4 (a) Sector distribution of total value added by region (percentage shares at current prices)

	1970	1975	1980	1985	1990	1995	2000	2005	2008
AFRICA									
Agriculture	24.5	21.6	18.0	20.3	18.4	16.7	15.3	15.6	16.5
Industry	32.0	38.1	44.2	38.5	35.4	32.8	35.5	38.8	40.7
Mining and utilities	11.7	16.5	23.9	17.4	15.2	13.7	18.4	23.0	25.7
Manufacturing	15.2	15.6	14.8	15.6	15.4	14.8	12.8	11.6	10.5
Construction	5.0	6.0	5.5	5.5	4.8	4.4	4.3	4.2	4.4
Services	43.5	40.3	37.8	41.2	46.1	50.5	49.2	45.7	42.8
Wholesale and retail trade, restaurant and hotels	14.5	13.1	12.5	13.8	14.3	15.0	14.2	13.0	12.8
Transports, storage and communications	6.5	6.0	6.2	6.5	6.7	7.2	7.2	7.5	7.0
Other activities	22.5	21.1	19.1	20.9	25.1	28.3	27.7	25.2	23.1
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
ASIA									
Agriculture	21.7	16.5	12.6	11.3	8.7	6.5	6.3	6.6	7.4
Industry	37.9	41.2	41.6	37.2	37.8	34.9	34.4	35.9	38.0
Mining and utilities	4.8	9.2	10.6	6.2	4.9	4.0	4.8	5.9	7.1
Manufacturing	27.5	24.9	23.8	24.6	24.8	23.5	23.4	24.2	25.2
Construction	5.7	7.0	7.2	6.5	8.0	7.4	6.3	5.8	5.7
Services	40.4	42.3	45.8	51.5	53.6	58.6	59.3	57.6	54.6
Wholesale and retail trade, restaurant and hotels	12.2	12.5	12.2	12.9	12.9	14.3	13.5	12.6	12.3
Transports, storage and communications	5.9	5.6	5.6	6.4	6.7	6.9	7.0	7.0	7.0
Other activities	22.4	24.2	28.0	32.2	34.0	37.4	38.8	37.9	35.3
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
EUROPE									
Agriculture	10.4	8.0	6.3	6.9	5.1	3.3	2.6	2.2	2.2
Industry	43.0	41.0	39.4	37.3	34.1	30.1	28.5	27.2	27.9
Mining and utilities	2.5	2.6	3.5	3.8	4.3	3.7	3.6	4.1	4.4
Manufacturing	32.4	30.3	28.5	26.9	23.0	20.3	19.3	17.2	17.2
Construction	8.1	8.0	7.4	6.6	6.8	6.2	5.6	5.9	6.4
Services	46.7	51.1	54.3	55.8	60.8	66.6	68.9	70.6	69.9
Wholesale and retail trade, restaurant and hotels	11.5	12.2	13.2	13.5	13.5	14.6	14.9	14.6	14.7
Transports, storage and communications	5.9	6.1	6.2	6.1	7.0	7.0	7.0	7.2	7.2
Other activities	29.3	32.8	34.9	36.2	40.3	45.0	47.0	48.8	48.1
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
LATIN AMERICA AND THE CARRIBEAN									
Agriculture	12.3	11.1	8.7	9.7	9.2	6.6	5.6	5.4	5.9
Industry	35.5	38.2	40.1	39.8	36.8	30.5	32.2	34.1	34.5
Mining and utilities	5.9	6.1	8.0	10.2	7.5	5.8	7.2	9.6	10.3
Manufacturing	23.3	25.0	24.2	24.2	23.7	19.1	19.3	18.7	18.1
Construction	6.3	7.1	7.9	5.4	5.7	5.6	5.8	5.8	6.0
Services	52.2	50.7	51.1	50.5	54.1	62.9	62.2	60.4	59.6
Wholesale and retail trade, restaurant and hotels	18.4	17.7	14.9	15.1	13.7	16.9	17.4	17.0	16.7
Transports, storage and communications	6.1	5.5	6.6	5.4	6.0	6.6	8.6	8.7	8.5
Other activities	27.7	27.5	29.6	30.0	34.4	39.4	36.2	34.7	34.4
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: UNIDO calculations based on UN Statistics Data.

Table 4 (b) Sector distribution of total value added by region (percentage shares at current prices)

	1970	1975	1980	1985	1990	1995	2000	2005	2008
NORTH AMERICA									
Agriculture	3.0	3.6	2.6	2.1	2.0	1.6	1.1	1.2	1.1
Industry	33.9	32.7	33.2	30.5	27.7	26.1	24.1	22.5	22.4
Mining and utilities	4.5	5.7	7.3	6.8	5.1	4.4	3.6	4.2	4.4
Manufacturing	24.2	21.9	21.0	19.1	18.1	17.7	16.0	13.3	13.1
Construction	5.2	5.1	4.9	4.6	4.6	4.0	4.5	5.0	4.9
Services	63.0	63.7	64.2	67.3	70.3	72.3	74.8	76.3	76.4
Wholesale and retail trade, restaurant and hotels	18.7	18.7	17.8	18.0	17.2	17.4	15.4	15.1	15.2
Transports, storage and communications	7.2	7.1	7.1	6.9	6.5	6.8	6.5	6.1	6.0
Other activities	37.2	37.9	39.3	42.4	46.6	48.1	52.9	55.1	55.2
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
OCEANIA									
Agriculture	8.6	7.2	7.6	5.8	4.6	4.7	4.9	3.8	3.4
Industry	36.9	35.2	34.9	33.4	28.5	27.8	25.9	27.4	28.2
Mining and utilities	6.1	7.3	9.2	10.1	8.3	7.3	7.6	9.0	9.7
Manufacturing	22.4	19.4	18.3	16.8	14.0	14.8	13.0	11.7	11.3
Construction	8.3	8.6	7.4	6.6	6.2	5.7	5.3	6.8	7.2
Services	54.5	57.6	57.5	60.8	66.9	67.4	69.2	68.8	68.4
Wholesale and retail trade, restaurant and hotels	13.7	13.2	11.9	13.7	14.2	15.0	14.1	13.8	13.4
Transports, storage and communications	8.3	7.8	7.7	8.5	8.6	8.7	8.0	7.5	7.5
Other activities	32.6	36.5	37.9	38.6	44.1	43.8	47.2	47.4	47.6
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
WORLD									
Agriculture	10.0	8.9	7.3	6.8	5.6	4.3	3.6	3.6	4.0
Industry	38.3	38.3	38.4	35.0	33.3	30.5	29.1	28.8	30.1
Mining and utilities	4.0	5.5	7.1	6.3	5.2	4.3	4.5	5.5	6.2
Manufacturing	27.7	25.9	24.6	23.0	21.7	20.3	19.2	17.8	18.1
Construction	6.5	6.9	6.7	5.8	6.3	5.9	5.4	5.5	5.7
Services	51.7	52.8	54.3	58.2	61.1	65.2	67.3	67.7	65.9
Wholesale and retail trade, restaurant and hotels	14.6	14.5	14.3	15.1	14.5	15.4	14.8	14.3	14.2
Transports, storage and communications	6.4	6.3	6.4	6.4	6.7	6.9	7.0	6.9	6.9
Other activities	30.7	32.0	33.6	36.7	39.9	42.8	45.5	46.4	44.8
TOTAL	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: UNIDO calculations based on UN Statistics Data.

Table 5 (a) Regional shares of world value added by sector (percentage shares at current prices)

	1970	1975	1980	1985	1990	1995	2000	2005	2008
AGRICULTURE									
Africa	6.3	7.7	8.9	9.0	7.3	6.8	7.8	9.4	10.3
Asia	33.5	34.0	36.9	37.1	39.0	47.3	51.1	50.0	52.3
Europe	41.6	37.4	34.7	32.2	32.6	24.4	19.1	19.5	17.9
Latin America and the Carribean	6.9	8.1	8.5	9.2	9.4	9.4	10.1	9.0	10.3
North America	10.5	11.3	9.2	11.2	10.5	10.5	10.1	10.1	7.7
Oceania	1.2	1.5	1.7	1.3	1.3	1.6	1.8	2.0	1.6
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
MINING AND UTILITIES									
Africa	7.6	9.5	12.2	8.3	6.5	5.5	7.6	9.1	10.5
Asia	18.4	30.9	31.6	21.8	24.2	28.9	31.6	29.6	32.6
Europe	24.6	20.1	19.7	19.1	29.7	27.3	21.3	23.8	23.3
Latin America and the Carribean	8.2	7.3	8.0	10.4	8.3	8.2	10.5	10.4	11.6
North America	39.0	29.7	26.4	38.1	28.8	27.6	26.7	24.0	19.2
Oceania	2.2	2.4	2.1	2.4	2.5	2.5	2.3	3.1	2.9
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
MANUFACTURING									
Africa	1.4	1.9	2.2	2.0	1.6	1.3	1.2	1.4	1.5
Asia	15.4	17.6	20.7	23.8	28.9	36.2	36.0	36.9	39.6
Europe	47.0	48.8	46.6	36.7	37.9	31.9	26.9	30.9	31.4
Latin America and the Carribean	4.7	6.3	7.0	6.8	6.3	5.8	6.6	6.2	7.0
North America	30.3	24.0	22.2	29.5	24.3	23.8	28.3	23.3	19.4
Oceania	1.2	1.4	1.2	1.1	1.0	1.1	0.9	1.2	1.2
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
CONSTRUCTION									
Africa	2.0	2.8	3.0	2.9	1.7	1.3	1.5	1.6	2.0
Asia	13.4	18.8	23.0	25.1	31.9	39.1	34.2	28.2	28.5
Europe	49.9	48.6	44.6	36.0	38.6	33.5	27.7	33.9	36.9
Latin America and the Carribean	5.4	6.7	8.5	6.1	5.1	5.8	7.1	6.2	7.3
North America	27.5	20.8	19.2	28.3	21.1	18.8	28.2	27.8	23.0
Oceania	1.8	2.3	1.8	1.7	1.6	1.4	1.4	2.3	2.4
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: UNIDO calculations based on UN Statistics Data.

Table 5 (b) Regional shares of world value added by sector (percentage shares at current prices)

	1970	1975	1980	1985	1990	1995	2000	2005	2008
WHOLESALE TRADE, RETAIL TRADE, RESTAURANT AND HOTELS									
Africa	2.6	2.9	3.2	2.7	2.2	1.7	1.8	2.0	2.3
Asia	12.9	15.8	18.3	19.0	22.5	28.9	26.9	23.9	24.7
Europe	31.7	35.0	37.3	28.1	33.4	30.3	27.0	32.5	34.3
Latin America and the Carribean	7.1	8.0	7.5	6.5	5.5	6.7	7.8	7.0	8.2
North America	44.4	36.6	32.4	42.4	34.8	31.0	35.2	32.8	28.7
Oceania	1.4	1.7	1.3	1.4	1.5	1.4	1.3	1.8	1.8
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
TRANSPORTS, STORAGE AND COMMUNICATIONS									
Africa	2.6	3.0	3.5	3.0	2.2	1.8	1.9	2.3	2.5
Asia	14.2	16.4	18.8	22.1	25.2	31.3	29.6	27.7	28.9
Europe	37.1	40.6	39.3	29.8	37.3	32.4	26.9	33.3	34.4
Latin America and the Carribean	5.3	5.7	7.4	5.4	5.1	5.8	8.2	7.5	8.5
North America	38.9	32.0	29.0	37.8	28.1	26.8	31.8	27.2	23.6
Oceania	1.9	2.3	1.9	2.0	2.0	1.9	1.6	2.0	2.0
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
OTHER ACTIVITIES									
Africa	1.9	2.1	2.1	1.7	1.4	1.2	1.1	1.2	1.3
Asia	11.3	13.9	17.8	19.6	21.5	27.2	25.2	22.2	22.5
Europe	38.3	42.7	41.7	31.0	36.2	33.6	27.7	33.5	35.6
Latin America and the Carribean	5.1	5.6	6.3	5.3	5.0	5.6	5.3	4.4	5.3
North America	41.9	33.6	30.4	41.0	34.2	30.8	39.3	36.8	33.2
Oceania	1.5	2.1	1.8	1.6	1.7	1.5	1.4	1.9	2.0
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
TOTAL									
Africa	2.6	3.2	3.6	3.0	2.2	1.7	1.9	2.2	2.5
Asia	15.5	18.4	21.4	22.3	25.3	31.2	29.5	27.2	28.5
Europe	40.2	41.7	40.2	31.4	35.9	32.0	26.8	31.8	33.2
Latin America and the Carribean	5.6	6.5	7.1	6.4	5.8	6.1	6.6	5.9	7.0
North America	34.6	28.4	26.0	35.4	29.3	27.4	33.8	31.0	26.9
Oceania	1.4	1.9	1.6	1.5	1.6	1.5	1.4	1.9	1.9
World	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: UNIDO calculations based on UN Statistics Data.

Table 6 Changes in regional shares of world value added 2000-2008: CMS analysis

	Performance	Structure	Adaptation	TOTAL
AFRICA				
Agriculture, hunting, forestry, fishing	0.09	0.04	0.00	0.13
Mining and utilities	0.15	0.14	0.02	0.31
Manufacturing	0.04	-0.01	0.00	0.03
Construction	0.03	0.01	0.00	0.03
Wholesale, retail trade, restaurants and hotels	0.07	-0.01	0.00	0.06
Transport, storage and communication	0.04	0.00	0.00	0.04
Other Activities	0.08	-0.01	0.00	0.07
TOTAL SECTORS	*0.50*	*0.16*	*0.01*	*0.66*
ASIA				
Agriculture, hunting, forestry, fishing	0.05	0.20	0.00	0.24
Mining and utilities	0.09	0.49	0.01	0.60
Manufacturing	0.63	-0.36	0.01	0.28
Construction	-0.31	0.09	0.00	-0.21
Wholesale, retail trade, restaurants and hotels	-0.33	-0.13	0.00	-0.46
Transport, storage and communication	-0.05	-0.02	0.00	-0.07
Other Activities	-1.23	-0.12	-0.03	-1.38
TOTAL SECTORS	*-1.14*	*0.15*	*0.00*	*-1.00*
EUROPE				
Agriculture, hunting, forestry, fishing	-0.05	0.07	0.00	0.02
Mining and utilities	0.08	0.41	-0.01	0.48
Manufacturing	0.82	-0.27	-0.02	0.53
Construction	0.50	0.12	0.00	0.62
Wholesale, retail trade, restaurants and hotels	1.08	-0.17	-0.01	0.90
Transport, storage and communication	0.52	-0.02	0.00	0.50
Other Activities	3.72	-0.36	0.00	3.36
TOTAL SECTORS	*6.67*	*-0.23*	*-0.03*	*6.42*
LATIN AMERICA AND THE CARIBBEAN				
Agriculture, hunting, forestry, fishing	0.01	0.04	0.00	0.05
Mining and utilities	0.06	0.17	0.01	0.24
Manufacturing	0.05	-0.07	0.00	-0.01
Construction	0.01	0.02	0.00	0.03
Wholesale, retail trade, restaurants and hotels	0.05	-0.04	0.00	0.02
Transport, storage and communication	0.02	0.00	0.00	0.02
Other Activities	0.03	-0.02	-0.01	0.00
TOTAL SECTORS	*0.25*	*0.10*	*0.00*	*0.35*
NORTH AMERICA				
Agriculture, hunting, forestry, fishing	-0.09	0.03	0.00	-0.06
Mining and utilities	-0.40	0.43	-0.03	-0.01
Manufacturing	-1.59	-0.32	0.00	-1.90
Construction	-0.29	0.09	0.00	-0.20
Wholesale, retail trade, restaurants and hotels	-0.94	-0.19	0.01	-1.12
Transport, storage and communication	-0.57	-0.02	0.00	-0.59
Other Activities	-2.87	-0.22	0.04	-3.04
TOTAL SECTORS	*-6.75*	*-0.19*	*0.01*	*-6.93*

OCEANIA				
Agriculture, hunting, forestry, fishing	-0.01	0.01	0.00	0.00
Mining and utilities	0.03	0.05	0.00	0.08
Manufacturing	0.04	-0.01	0.00	0.03
Construction	0.05	0.01	0.00	0.06
Wholesale, retail trade, restaurants and hotels	0.07	-0.01	0.00	0.06
Transport, storage and communication	0.03	0.00	0.00	0.03
Other Activities	0.26	-0.02	0.00	0.24
TOTAL SECTORS	*0.48*	*0.02*	*0.00*	*0.50*

Source: UNIDO calculations based on UN Statistics Data.

UN NATIONAL ACCOUNT STATISTICS CLASSIFICATION BASED ON ISIC 3.1:

Agriculture, hunting, forestry and fishing
Section A Agriculture, hunting and forestry and
Section B Fishing

Mining, manufacturing and utilities
Section C Mining and quarrying,
Section D Manufacturing and
Section E Electricity, gas and water supply

Manufacturing
section D Manufacturing

Construction
Section F Construction

Transport, storage and communication
Section I Transport, storage and communication

Wholesale, retail trade, restaurants and hotels
Section G Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods and
Section H Hotels and restaurants

Other activities:
Section J Financial intermediation,
Section K Real estate, renting and business activities,
Section L Public administration and defence, compulsory social security,
Section M Education,
Section N Health and social work,
Section O Other community, social and personal service activities and
Section P Activities of private households as employers and undifferentiated production activities of private households

(see ISIC Rev 3.1).

List of countries included in the benchmark database on manufacturing value added

Argentina
Australia
Belgium
Bolivia
Brazil
Canada
Chile
Colombia
Denmark
Ecuador
Egypt
Finland
Greece
India
Indonesia
Italy
Japan
Kenya
Mexico
Poland
Republic of Korea
Singapore
South Africa
Spain
Sweden
Turkey
United Kingdom
USA
Uruguay
Zimbabwe

Technical notes

For this paper we used data extracted from the UNIDO database INDSTAT2 2009 Rev 3[5]. This database is derived from two existing UNIDO Databases, INDSTAT3 and INDSTAT4, using ISIC Revision 2 and Revision 3.

INDSTAT2 combines historical time series data from 1963 to 2007 for 161 countries for number of establishments, employment, wages and salaries, output, value added, gross fixed capital formation and number of female employees at the 2-digit level of ISIC, All Economic Activities, Revision 3 in the manufacturing sector comprising the ISIC categories 15 to 37.

The value figures are presented in current prices in local currencies and in US dollars. The INDSTAT2 database also includes the index numbers of industrial production (IIP) at the 2-digit level of ISIC, Revision 3. The IIP can be used to create real values and for calculating the real growth of production volume on the 2-digit ISIC level.

While the UNIDO INDSTAT2 database provides the data as close to the original country reports as possible, additional data and some manipulations are required for the analytical work on structural transformation in manufacturing. Those include:

- Revisiting the composition of ISIC sub-categories is sometimes necessary to harmonize this classification scheme with others such as HS and SITC.
- To ensure consistency of time series sectors in manufacturing that were not disaggregated in Revision 2 have been aggregated in also in Revision 3.

[5] http://www.unido.org/index.php?id=1000310

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