



**THE ECONOMIC
FOOTPRINT OF THE
PHARMACEUTICAL
INDUSTRY**

**REGIONAL BREAKDOWN
AND DIFFERENTIATION
BETWEEN ORIGINATORS
AND GENERICS**

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THE PROJECT

In 2013 our initial project, “Measuring the Economic Footprint of the Pharmaceutical Industry – Feasibility Study”, examined for the first time the global economic importance of the pharmaceutical industry. The present research project updates and refines the analysis of the pharmaceutical industry’s direct economic impact with a breakdown by region and between originators and generics. For the regional breakdown we have used the UN geographical regions of Africa, Latin and North America, Asia, Europe, and Oceania.

MACROECONOMIC INDICATORS TO ASSESS THE ECONOMIC FOOTPRINT

Relevant macroeconomic ratios include:

- | | |
|---------------------|-------------------------|
| • GROSS VALUE ADDED | • EMPLOYEE COMPENSATION |
| • JOB CREATION | • PRODUCTION VALUE |

Using these ratios, we can answer the following questions:

- » What is the global gross value added of the pharmaceutical industry? How important is the sector for the world economy?
- » How many jobs does the pharmaceutical industry account for worldwide? How has hiring behaviour changed over the period under review?
- » How much is employee compensation in the global pharmaceutical industry? How much is the average employee compensation per person?
- » How has the value of production of the global pharmaceutical industry changed over the period under review?
- » What is the differential economic impact in Africa, Latin America, North America, Asia, Europe, and Oceania?
- » How big is the economic contribution of generics?

KEY RESULTS

The results of our study should help to change perceptions of the pharmaceutical industry, from a cost driver to a motor for value added and employment. The most important results can be summarized as follows:



The pharmaceutical industry increased its contribution to global value added (global GDP) by 6.0 percent annually between 2006 and 2012, reaching a total of USD 437 billion.



More than 4.4 million people worldwide are employed in the pharmaceutical industry.



The global economic power of the sector roughly corresponds to the economic performance of Argentina, and there are almost as many people employed in the sector as the total employed in all sectors in Belgium.



Asia has the highest share of global direct gross value added amounting to approximately USD 163.3 billion, followed by Europe (USD 134.8 billion) and North America (USD 105.3 billion).



Over 3 million people are employed by the pharmaceutical industry in Asia. In Europe the industry employs around 750,000 people, almost three times the number in North America, where the industry has just over 270,000 employees.



Average labour productivity in the global pharmaceutical industry was USD 98,300 in 2012. North America has by far the highest apparent labour productivity (USD 387,800 per person employed in 2012). In comparison, the apparent labour productivity in a industrialized country like Germany was USD 75,500 in 2012.



Originators in the pharmaceutical industry contribute 60 percent of the industry's global gross value added and 42 percent of its employment.

GROSS VALUE ADDED EFFECTS

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In 2012 the pharmaceutical industry accounted for 3.8 percent of the gross value added in manufacturing worldwide, roughly equivalent to the total gross value added of Argentina

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Gross domestic product (GDP), the most important economic indicator, serves as a measure of a national economy's performance and is calculated as the sum of the gross value added generated by all domestic companies.

Gross value added (GVA) is the value of the output produced by a company less the value of its purchased materials and services. It thus reflects the additional value generated by the production process. We can use this measure to show the contribution of an industry to GDP. We can also compare the industry's development with national GDP growth rates.

Between 2006 and 2012, gross value added in the pharmaceutical industry increased by USD 128.6 billion to reach USD 436.8 billion (Table 1).

TABLE 1: GROSS VALUE ADDED IN THE PHARMACEUTICAL INDUSTRY

	2006	2007	2008	2009	2010	2011	2012
Gross value added (USD billion)	308.2	342.5	377.3	397.3	417.6	439.2	436.8
Growth rate (%)		11.1	10.2	5.3	5.1	5.2	-0.5
Global share (%)	0.61	0.60	0.61	0.67	0.65	0.62	0.60

Source: SNA, INDSTAT4, ESA, STAN Database, own calculation.

The increase corresponds to an average annual growth rate of 6.0 percent. In 2012 the pharmaceutical industry accounted for 3.8 percent of the gross value added in manufacturing worldwide. The economic strength of the sector roughly corresponds to the GVA of Argentina of USD 434.7 billion [UN Statistics Division (2014)].

REGIONAL BREAKDOWN OF GROSS VALUE ADDED

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Gross value added of the pharmaceutical industry grew strongly in Asia, by 11.5 percent annually between 2006 and 2012, compared with 4.4 percent in Europe and 1.7 percent in North America

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The regional breakdown of gross value added (Table 2) shows that Asia, Europe and North America are the most important producers of pharmaceuticals.

TABLE 2: REGIONAL BREAKDOWN OF GROSS VALUE ADDED (USD BILLION)

	2006	2007	2008	2009	2010	2011	2012	CAGR
Asia	85.1	94.9	119.9	131.1	148.7	157.2	163.3	11.5%
Europe	104.3	120.9	135.1	130.5	135.1	146.0	134.8	4.4%
Northern America	95.4	100.4	94.2	110.5	104.9	102.6	105.3	1.7%
Latin America	18.5	20.8	22.7	18.4	20.4	25.2	24.9	5.1%
Africa	3.1	3.4	3.3	4.4	5.0	5.0	5.1	8.8%
Oceania	1.8	2.2	2.1	2.4	3.5	3.2	3.3	11.0%
Pharmaceutical industry, total	308.2	342.5	377.3	397.3	417.6	439.2	436.8	6.0%

Source: SNA, INDSTAT4, ESA, STAN Database, own calculation.

Gross value added in Asia amounted to USD 163.3 billion in 2012, nearly twice as much as in 2006, while the pharmaceutical industry in Europe generated gross value added of USD 134.8 billion. In North America gross value added was USD 105.3 billion in 2012. In terms of share, Asia accounted for 37.4 percent of the pharmaceutical industry's gross value added worldwide, Europe accounted for 30.9 percent and North America for 24.1 percent. The compound annual growth rate (CAGR) shows strong growth of the industry in Asia of 11.5 percent between 2006 and 2012, compared with 4.4 percent in Europe, and 1.7 percent in North America.

EMPLOYMENT EFFECTS

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The number of people employed worldwide in the pharmaceutical industry is roughly equivalent to total employment in Belgium

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The pharmaceutical industry employs approximately 4.4 million people worldwide. The number of employees increased by 790,000 between 2006 and 2012 (Table 3).

TABLE 3: EMPLOYMENT IN THE PHARMACEUTICAL INDUSTRY (HEADCOUNT IN THOUSANDS)

	2006	2007	2008	2009	2010	2011	2012
Employment	3,649	3,680	3,829	3,919	4,070	4,237	4,443
Growth rate		0.9%	4.0%	2.3%	3.9%	4.1%	4.9%

Source: INDSTAT4, ILOSTAT, ESA, STAN Database, own calculation.

This growth corresponds to an average annual employment increase of 3.3 percent. For comparison, the number of people employed worldwide in the pharmaceutical industry is roughly equivalent to total employment in Belgium, where about 4.5 million people were employed in 2012 [Eurostat (2014)].

REGIONAL EMPLOYMENT BREAKDOWN

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Over 3 million people work in the pharmaceutical industry in Asia. In Europe the industry employs around 750,000 people, almost three times greater than in North America

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The regional employment breakdown in the pharmaceutical industry is shown in Table 4.

TABLE 4: REGIONAL BREAKDOWN OF EMPLOYMENT (HEADCOUNT IN THOUSANDS)

	2006	2007	2008	2009	2010	2011	2012	CAGR
Asia	2,153	2,197	2,369	2,507	2,662	2,820	3,003	5.7%
Europe	737	741	734	716	728	738	749	0.3%
Northern America	310	307	302	283	281	276	271	-2.2%
Latin America	232	231	239	240	236	242	259	1.8%
Africa	199	187	169	156	146	143	142	-5.6%
Oceania	17	17	17	18	17	18	18	1.2%
Pharmaceutical industry, total	3,649	3,680	3,829	3,919	4,070	4,237	4,443	3.3%

Source: INDSTAT4, ILOSTAT, ESA, STAN Database, own calculation.

Over 3 million people work in the pharmaceutical industry in Asia, where employment has grown by about 40 percent since 2006. Around 750,000 employees work in the European pharmaceutical industry, almost three times as many as in North America (just over 270,000 employees). The pharmaceutical industry in the rest of the world, i.e. Latin America, Africa, and Oceania, employed about 420,000 people in all. Asia thus accounted for 67.5 percent of global employment, followed by Europe with 16.9 percent. About 6 percent of pharmaceutical industry employees work in North America.

REGIONAL APPARENT LABOUR PRODUCTIVITY

The regional breakdown of apparent labour productivity, defined as gross value added per person employed, is shown in Table 5.

TABLE 5: APPARENT LABOUR PRODUCTIVITY IN THE PHARMACEUTICAL INDUSTRY (GROSS VALUE ADDED PER PERSON EMPLOYED IN USD)

	2006	2007	2008	2009	2010	2011	2012
Asia	39,500	43,200	50,600	52,300	55,900	55,700	54,400
Europe	141,500	163,000	184,000	182,400	185,600	197,800	179,900
Northern America	307,300	327,000	312,500	390,600	373,700	372,000	387,800
Latin America	79,900	89,900	95,200	76,600	86,400	103,900	96,400
Africa	15,500	18,200	19,300	28,200	34,000	35,000	36,300
Oceania	104,500	125,400	123,200	131,900	207,100	173,300	181,500
Pharmaceutical industry, total	84,500	93,100	98,500	101,400	102,600	103,700	98,300

Source: INDSTAT4, ILOSTAT, ESA, STAN Database, own calculation.

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The pharmaceutical industry in North America has by far the highest apparent labour productivity, with gross value added per person employed of USD 387,800 in 2012

The values in the last row of Table 5 show average apparent labour productivity in the pharmaceutical industry. The average gross value added per person employed amounted to USD 98,300 in 2012. North America has by far the highest apparent labour productivity (USD 387,800 per person employed in 2012). Asia, which has the biggest share of gross value added and employment, has the second lowest apparent labour productivity (USD 54,400 per employee). Labour productivity will evidently be higher when driven by productive inputs such as a skilled workforce, investment or research and development expenditures. In comparison, apparent labour productivity in an industrialized country like Germany was USD 75,500 in 2012.

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EMPLOYEE COMPENSATION

In 2012 the pharmaceutical industry paid wages and salaries totalling USD 91.3 billion. Compensation rose by 6.0 percent a year on average from 2006 to 2012 (Table 6).

TABLE 6: EMPLOYEE COMPENSATION IN THE PHARMACEUTICAL INDUSTRY

	2006	2007	2008	2009	2010	2011	2012
Wages & salaries (USD billion)	64.3	71.4	81.3	79.3	84.1	91.9	91.3
Growth rate		11.0%	13.9%	-2.5%	6.1%	9.3%	-0.7%
Wages & salaries per employee	17,600	19,400	21,200	20,200	20,700	21,700	20,600
Growth rate		10.1%	9.5%	-4.8%	2.2%	5.0%	-5.3%

Source: INDSTAT4, ESA, STAN Database, own calculation.

Moreover, it should be noted that employee compensation increased much faster than the number of employees. Hence, wages and salaries per employee rose by USD 3,000 to USD 20,600 between 2006 and 2012, an increase of 16.6 percent.

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DIFFERENTIATION BETWEEN ORIGINATORS AND GENERICS – GROSS VALUE ADDED EFFECTS

The last step of the research project tested the feasibility of differentiating the contributions of originators and generics to global direct gross value added and employment in 2012. Table 7 presents the gross value added effects.

TABLE 7: DISTRIBUTION OF GLOBAL GROSS VALUE ADDED BY ORIGINATORS, GENERICS, AND OTHER DRUGS, 2012¹

Gross value added (in USD billion)	2012	Global shares
Originators	262.2	60.0%
Generics	122.4	27.9%
Other drugs	52.2	11.9%

Source: Own calculation, IMS Health (2013).

The gross value added by originators amounted to USD 262.2 billion in 2012, 60.0 percent of global gross value added by the pharmaceutical industry. The generics industry contributed gross value added of USD 122.4 billion, giving it a 27.9 percent share of global value added.

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In 2012 gross value added by originators accounted for 60.0 percent of the gross value added worldwide by the pharmaceutical industry, while the generics sector contributed 27.9 percent

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¹ Our initial assessment assumed that the share of the value of sales in the relevant markets equalled the gross value added shares. Other drugs include OTC, diagnostic and non-therapeutic pharmaceuticals.

DIFFERENTIATION BETWEEN ORIGINATORS AND GENERICS – EMPLOYMENT EFFECTS

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The number of people employed by originators worldwide is higher than total manufacturing employment in Canada

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Despite contributing half the share of gross value added generated by originators, the generics industry employs more people, accounting for 46.6 percent of total pharmaceutical industry employment, or approximately 2.1 million people in terms of headcount (Table 8).

TABLE 8: DISTRIBUTION OF EMPLOYMENT BY ORIGINATORS, GENERICS, AND OTHER DRUGS, 2012²

Employment (headcount)	2012	Global shares
Originators	1,860,300	41.9%
Generics	2,068,800	46.6%
Other drugs	513,500	11.6%

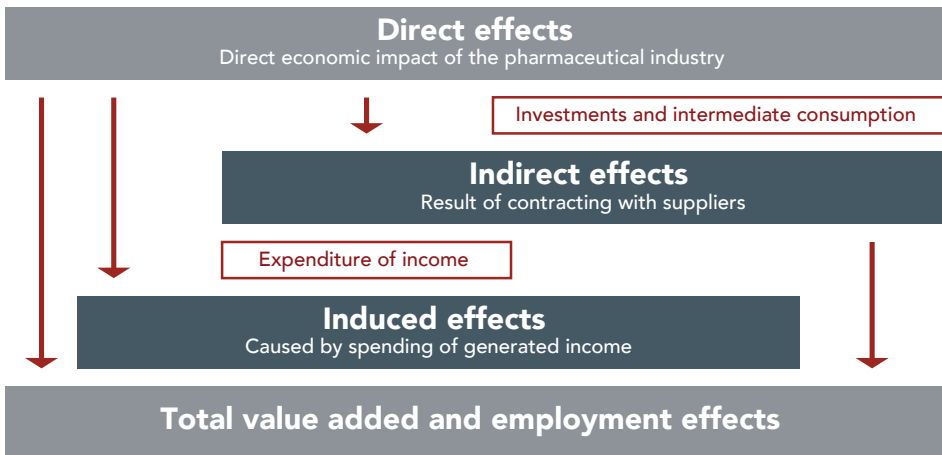
Source: Own calculation, IMS Health (2013).

The originators industry employed approximately 1.9 million people in 2012, 41.9 percent of the global total, which is higher than total manufacturing employment in Canada.

BEYOND DIRECT ECONOMIC EFFECTS: THE SPILLOVER EFFECTS

In addition to its direct impact, an industry’s economic importance reflects often underestimated spillover effects that arise from its business activity. Spillover effects for the pharmaceutical industry – schematically represented in Figure 1 – manifest themselves throughout the global economy. The industry’s overall economic impact could be identified using input-output analysis.

FIGURE 1: DIMENSIONS OF THE ECONOMIC FOOTPRINT



² Our initial assessment assumed that the share of the value of sales in the relevant markets equalled the employment shares. Other drugs include OTC, diagnostic and non-therapeutic pharmaceuticals.

Spillover effects can be divided into indirect effects, which are generated within the supply chain of purchased materials and services, and induced effects, which result from spending of the incomes generated through direct and indirect effects.

In the light of looming regulatory efforts of governments worldwide, the pharmaceutical industry is concerned to clarify the extent of its economic footprint and its interdependencies with other sectors. The next research step should therefore consist of a comprehensive empirical analysis of its economic footprint, including spillover effects. This undertaking would help illustrate the complete value added chain of the global pharmaceutical industry.

ANNEX

FIGURE 2: VISUALIZATION OF REGIONAL GROSS VALUE ADDED EFFECTS
(absolute values in USD billion, global share in %, and the compound annual growth rate (CAGR) as per the colour key)

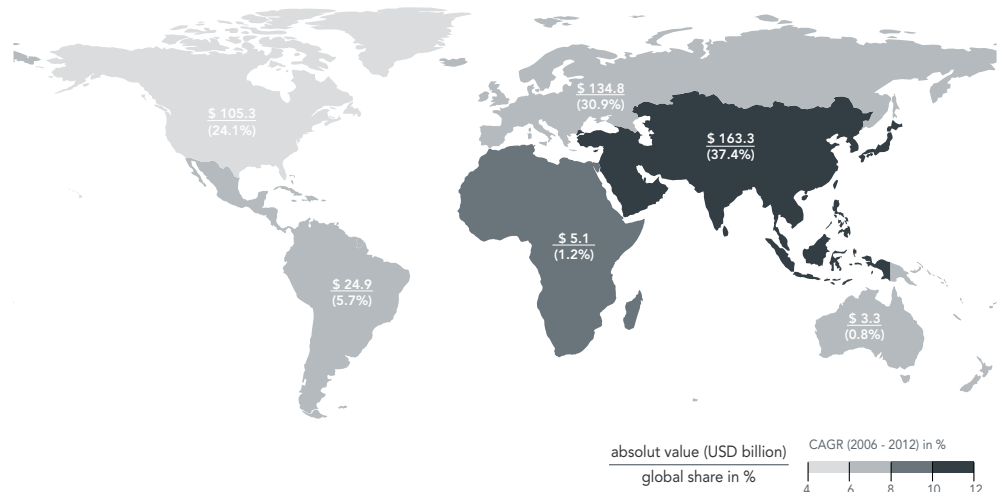
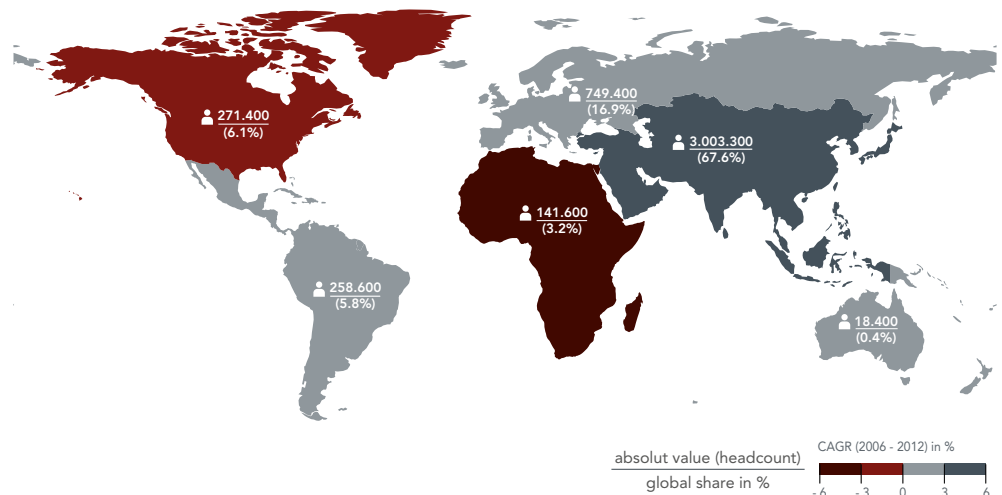


FIGURE 3: VISUALIZATION OF REGIONAL EMPLOYMENT EFFECTS
(absolute values in USD billion, global share in %, and the compound annual growth rate (CAGR) as per the colour key)





ABOUT WIFOR

WifOR is an independent economic research institute which emerged as a spin-off from the Department of Public Economics and Economic Policy at Darmstadt University of Technology (TU Darmstadt). TU Darmstadt and TU Berlin are official partners of WifOR. The institute's research focuses on economic footprint and value added analyses, labour market research, health economics, the healthcare industry, and the security industry.

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