Global and Regional Trends in Agriculture Value Added and Gross Fixed Capital Formation

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The increasing contribution of Asia & Pacific and Africa to global agriculture value-added…

Between 1970 and 2014, real global value-added in the Agriculture, Forestry and Fishing (AFF) sector rose from $0.7 trillion to $1.9 trillion (in 2005 USD). At regional level, the increase was most vigorous in Africa and Asia & Pacific as both regions witnessed a 4-fold increase of their real agriculture value added measured in 2005 constant USD. In the other regions, the increase was less remarkable with multiplicative factors ranging from 3.1 in Latin America and Caribbean to a lower 1.1 in the Other Developed region.
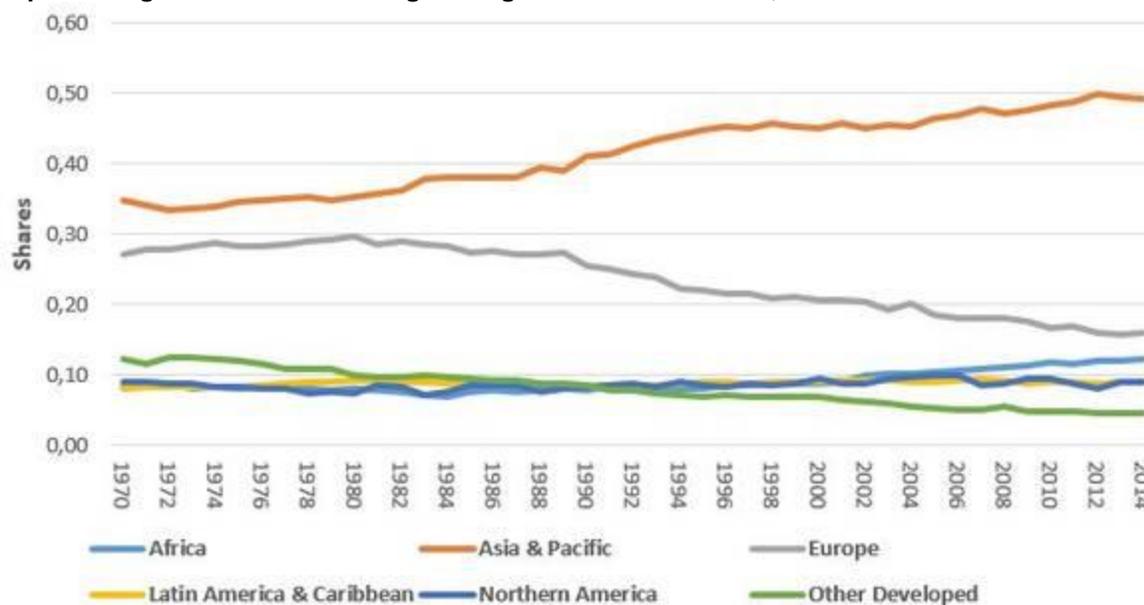
Table 1 – Value added in Agriculture, Forestry, and Fishing by region (billions, constant 2005 USD)

Region	1970	1980	1990	2000	2014	Multiplying factor (1970-2014)
Africa	56.2	66.9	88.2	115.4	233.4	4.15
Asia & Pacific	235.5	294.3	456.0	597.4	943.7	4.01
Europe	183.9	248.1	283.4	274.1	304.7	1.66
Latin America & Caribbean	55.3	76.6	92.9	118.5	171.3	3.10
Northern America	61.2	62.1	93.4	125.7	173.2	2.83
Other Developed[*]	83.1	83.1	96.1	92.3	87.6	1.05
Global	**675.2**	**831.2**	**1,110.0**	**1,323.5**	**1,914.0**	**2.83**

Other Developed includes Australia, Japan and New Zealand

As a result of these inter-regional growth differentials, the 1970-2014 period was characterized by a shift in the distribution of the regional contributions to the global agriculture value-added. In 1970, the leading trio of contributors to global value-added in AFF were Asia and the Pacific (34.9%), Europe (27.2%), and the Other Developed region (12.3%). By 2014, Asia and the Pacific's contribution to the agriculture global value-added had risen to 49.3% while the shares for Europe and the Other Developed region had shrunken to 15.9% and 4.6% respectively. Africa's contribution to global agriculture value added – though more limited in extend - increased from 8.2% to 12.2% over the same period. The global contributions of the two other regions remained relatively stable with a slight increase from 8.3% to 8.9% for Latin America and the Caribbean, and around a stable 9.1% share for Northern America.

Graph 1 – Regional contribution to global agriculture value-added, shares. 1990-2014

*Other Developed includes Australia, Japan and New Zealand

…despite declining regional contributions of Agriculture, Forestry and Fishing to GDP.

Table 2 presents average annual growth rates for agriculture value-added and GDP measured in constant price. Real value-added in agriculture grew at a global annual average rate of 2.4% between 1970 and 2014 while global real GDP grew at 3.0% annually. It is worth noting that annual growth was systematically lower for value-added in agriculture compared to the overall economy GDP both at regional and global levels, indicating that on average the other sectors of the economy experienced faster growth. This was also the case for regions such as Africa, Asia & Pacific and Latin America & Caribbean, whose averages in agriculture value-added growth tended to be higher.

Table 2: Average real AFF value added and GDP growth rate, constant 2005 USD, 1970-2014

		1971-1980	1981-1990	1991-2000	2001-2010	2011-2014	1970-2014
Africa	Value-added AFF	1.82%	2.86%	2.81%	5.80%	3.63%	3.35%
	GDP	4.15%	2.30%	2.43%	5.28%	3.10%	3.50%
Asia & Pacific	Value-added AFF	2.27%	4.50%	2.75%	3.34%	3.29%	3.22%
	GDP	5.79%	5.45%	5.89%	6.90%	5.92%	6.00%
Europe	Value-added AFF	3.06%	1.37%	-0.30%	0.51%	1.69%	1.21%
	GDP	3.37%	2.46%	1.77%	1.62%	0.89%	2.18%
Latin America & Caribbean	Value-added AFF	3.32%	1.97%	2.47%	2.78%	2.46%	2.62%
	GDP	6.03%	1.51%	3.18%	3.16%	2.88%	3.42%

Northern America	Value-added AFF	0.19%	4.58%	3.16%	2.78%	2.09%	2.62%
	GDP	*3.27%*	*3.30%*	*3.41%*	*1.68%*	*1.97%*	*2.83%*
Other Developed	Value-added AFF	0.11%	1.49%	-0.30%	-0.90%	1.31%	0.21%
	GDP	*4.24%*	*4.41%*	*1.44%*	*1.15%*	*1.08%*	*2.65%*
Global (total)	Value-added AFF	2.11%	2.94%	1.79%	2.65%	2.75%	2.40%
	GDP	*3.79%*	*3.14%*	*2.77%*	*2.59%*	*2.44%*	*3.02%*

*Other Developed includes Australia, Japan and New Zealand

This growth differential resulted in a decreased contribution of agriculture, forestry and fishing to real global GDP from 4.3% to 3.3%.

At a regional level, the rapidly increasing contribution of Asia & Pacific to global agriculture value-added (Graph 1) might stand at odds with the sector's declining share of its regional GDP from 23.6% in 1970 to 7.3% in 2014 (Graph 2). However, that might be reflective of the region's higher investment ratios in the agricultural sector compared to the other regions and, concomitantly, the other non-agriculture sectors in the Asia & Pacific region benefiting from even higher investments.

Graph 2 – Agriculture value-added as a share of regional GDP. 1990-2014
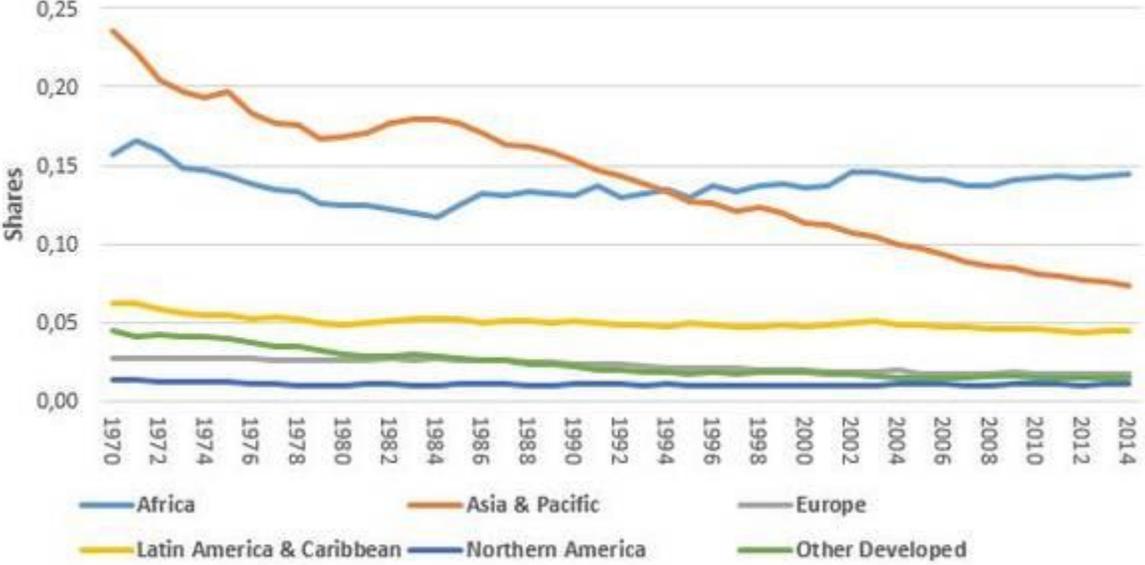
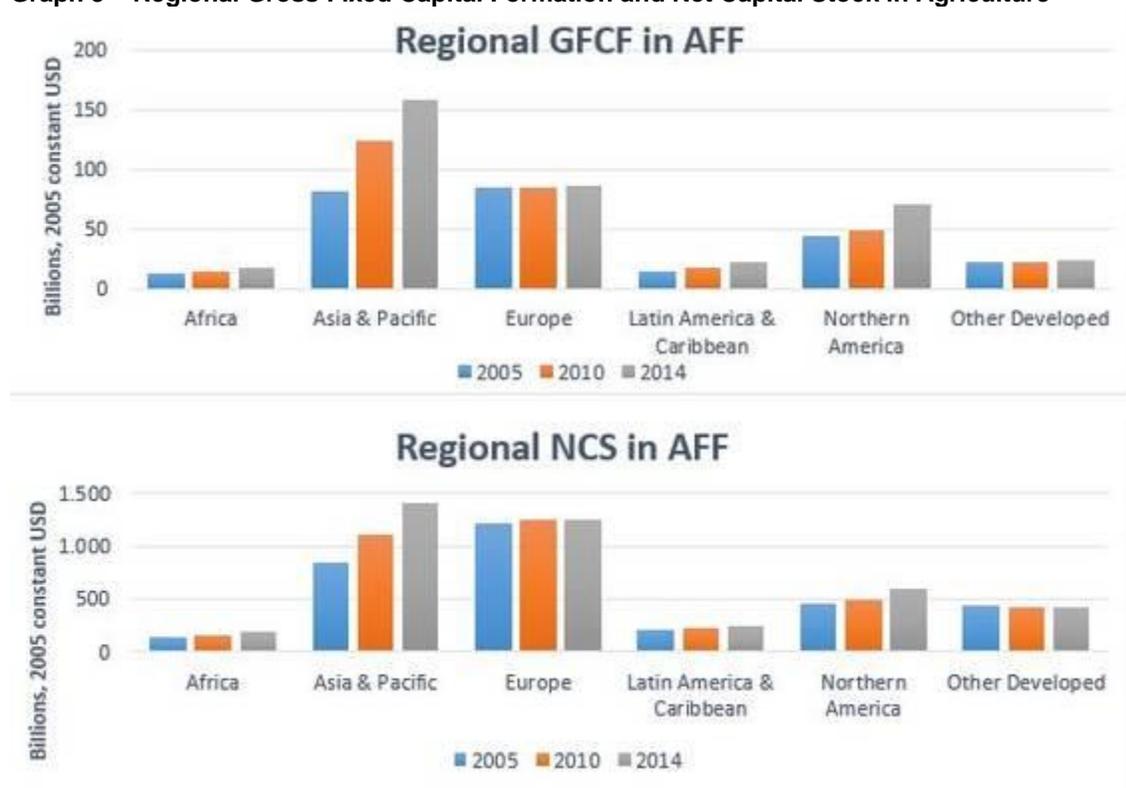**Other Developed includes Australia, Japan and New Zealand*

Investment drives growth in real agriculture value-added and GDP…

Increased investments in physical capital leading to higher capital stock in agriculture, forestry, and fishing is one possible driver of the real long-term growth in agriculture value-added that has been evidenced here above (Table 1

and Table 2). Over the 2005-2014 decade, global annual physical investment flows in agriculture – as measured by Gross Fixed Capital Formation in agriculture – rose by almost 50% from $259 to $378 billion in constant 2005 USD.

However, this rise is again not uniform across all regions: while annual flows of physical investment in the agriculture sector doubled in Asia & Pacific over the last decade, it remained stagnant in Europe and in the Other Developed regions. For the remaining regions, agricultural physical investment flows increased by around 34% in Africa, 54% in Latin America & Caribbean and 62% in Northern America. As displayed in Graph 3, these diverging regional trends in investment directly translated into the agricultural capital stock data (remember that investment flows add up to build capital stocks after adjustment for depreciation).

Graph 3 – Regional Gross Fixed Capital Formation and Net Capital Stock in Agriculture

Other Developed includes Australia, Japan and New Zealand

It is worth mentioning that similar inter-regional diverging patterns on investment in physical capital are present when the overall economy is considered (all sectors together). Gross fixed capital formation (GFCF) was a key driver of GDP growth, as it rose from $3.6 trillion (2005 USD) to $13.8 trillion between 1970 and 2014. The investment ratio - GFCF as a proportion of GDP - remained relatively stable at around 22% throughout the period. At regional level, the investment ratios for Africa, Europe, and Latin America & Caribbean present downward trends while Northern America on the contrary saw its investment ratio increasing from 0.18 in the 1970s to 0.20 at the beginning of the 21st century.

Table 3: Average Investment Ratio (GFCF share of GDP), by region, 1970-2014

Annual average investment ratios	1970-1979	1980-1989	1990-1999	2000-2009	2010-2014	1970-2014
Northern America	0.18	0.19	0.20	0.22	0.20	0.20
Europe	0.25	0.23	0.21	0.21	0.20	0.22
Other Developed*	0.27	0.26	0.27	0.23	0.22	0.25
Asia & Pacific	0.20	0.24	0.27	0.29	0.35	0.26
Latin America & Caribbean	0.24	0.20	0.19	0.20	0.22	0.21
Africa	0.25	0.21	0.17	0.18	0.22	0.21
Global	0.23	0.22	0.22	0.23	0.23	0.22

*Other Developed includes Australia, Japan and New Zealand

…with investment intensity higher in developed countries.

The Investment Ratio Agriculture Orientation Index (IRAOI) provides a measure of how the investment intensity in agriculture compares to that of the total economy. More specifically, the Agriculture Orientation Index for the Investment Ratio for country i is defined as follows:

$$IR_{AOI} \equiv \left(\frac{GFCF_{AFF}}{VA_{AFF}}\right)_i \Big/ \left(\frac{GFCF}{GDP}\right)_i.$$

From this definition it appears that countries with a higher investment intensity in agriculture compared to overall economy will have an IRAOI greater than 1, indicating that on average a larger share of each unit of value-added is spent on GFCF in agriculture compared to the other sectors of the economy. Interestingly, in developed countries, the average IRAOI was above 1.4 in 2014 while it settled to 0.53 in developing countries. That is, in countries where agriculture has become less important as a contributor to GDP, the investment intensity is even higher than for the other non-agricultural sectors taken as a whole, suggesting for a highly mechanized agricultural sector. Graph 4 shows the positive relationship that exists between the IRAOI and economic development as measured by 2014 GDP per capita.

Graph 4 – Investment Ratio Agriculture Orientation Index vs. real GDP per Capita. 2014
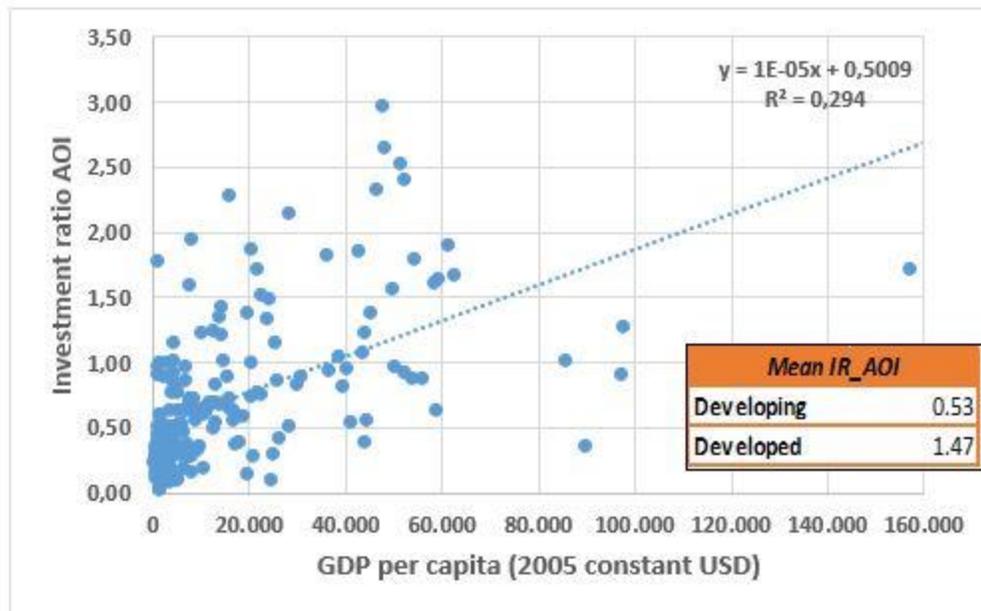
Outliers Luxembourg and Liechtenstein excluded for graphical readability.

Technical background

Gross Domestic Product (GDP), the most frequently quoted indicator of economic performance, is a comprehensive measure of the total gross value added generated within an economy over a specific time period. Real per capita GDP may, however, be a more a relevant indicator for cross-country comparisons in the context of economic development, given that it takes into account differences in population size, and can highlight to what extent growth in the economy tends to translate into an increase in productivity.

Data on AFF Value Added refer to the industry including agriculture, forestry and fishing, according to the International Standard Industrial Classification of All Economic Activities (ISIC).

Gross fixed capital formation (GFCF) captures the net additions (acquisitions less disposals) to the stock of fixed capital assets such as machinery, transport equipment, infrastructures and buildings within an economy. It is a useful indicator to identify and monitor developments in investment trends over time, particularly as capital accumulation is a growth enhancing phenomenon as it increases the productive capacity of an economy, making large-scale production possible and promoting a greater degree of specialization. Differences in the investment ratios (measured by the GFCF share in Gross Domestic Product) across countries can explain differences in growth, and according to endogenous growth theory, can mirror different levels of economic development and catching-up processes.

The system of national accounts serves as reference for the conceptual definition of the main economic variables included in the Macro-Statistics domain available on FAOSTAT and that is the source for the present analysis.

Definitions and acknowledgements

The above analysis relies combined information coming from the Macro-Indicators and Agricultural Capital stock databases both available on FAOSTAT under the Macro-Statistics domain.

The Agricultural Capital Stock domain in FAOSTAT provides data on key indicators including Gross Fixed Capital Formation, Net and Gross Capital Stock, Consumption of Fixed Capital, Investment ratio, and the Gross Fixed Capital Formation Agriculture Orientation Index. The sector coverage is limited to the Agriculture, forestry, and fishery (ISIC Rev.3: A+B) activity group though the corresponding variables for the total economy can be found on FAOSTAT domain entitled "Macro-Indicators".

The FAO Capital Stock Database is an analytical database. Whenever available, the database integrates official national accounts data harvested from UNSD or OECD. If the full set of official data is not available for a specific country, estimation procedures are employed to obtain estimates for the entire time series.

Data on agricultural GFCF are available for over 200 countries. For some 100 countries, data on agriculture GFCF were fully missing and are imputed based on panel regression approach (with an adjustment on the series level to ensure coherence with the agriculture consumption of fixed capital series whenever available from UNSD OCD). For many of the other countries data are available only for a limited number of years in which case data for the missing years have been imputed using the available data as the base for investment ratio using ARMAX modelling. Data on NCS, GCS and CFC are available for just over 200 countries. It should be noted that most of the country data have been calculated by FAO following the PIM approach as presented in the OECD Manual on Capital Stock (2009).

The time coverage for the agricultural capital stock database is 1990 to 2014 as far as data availability permits. For some countries data on GFCF are available only from 1995. Therefore, regional aggregation regarding the GFCF variable should not be performed for the period 1990-1994. For many countries, NCS series and GCS starts in the mid-2000s. Therefore, the greatest care should be attached to the effective country coverage when compiling regional aggregates.

For more information on the methodology regarding the Agriculture capital stock database, please refer to the metadata available through FAOSTAT.