

## **INTERSECTORAL RELATIONS OF AGRICULTURE AND AGRO-BASED INDUSTRIES WITHIN THE BRAZILIAN ECONOMY**

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### **ABSTRACT:**

Despite the historical trend of declining importance of agriculture and livestock sector in the Brazil's workforce and GDP, the sector remains crucial as a provider of food for the population, a purchaser of inputs and services produced by other sectors, a supplier of raw materials to several industries, and a major exporting sector. The last three functions create strong backward and forward linkages in the economy, shaping the Brazil's agribusiness. Brazil's agribusiness GDP had increased by nearly 65% (in real terms) from 2000 to 2023. Despite the fact that during the last 24 years the agribusiness had reduced its share in the Brazil's total GDP, it still answered for 25% of the Brazilian GDP, on average, in the years ranging from 2021 to 2023. The strong expansion of Brazilian agribusiness in the first quarter of the 21st century (in particular, the growth of its GDP) is largely explained by the increase in its exports. According to data collected from the Brazil's Ministry of Agriculture and Livestock, the current-dollar value of Brazilian agribusiness exports grew by 673% between 2000 and 2022. Among these exports, the highest growth took place in agricultural and agro-industrial product exports. According to FAO, the current-dollar value of exports from these two agribusiness sectors increased by 843% between 2000 and 2022. This growth was strongly determined by Chinese GDP growth, which came up as a major buyer of Brazilian agricultural and agro-industrial products. However, international trade is a "two-way street". To export more, it is also necessary to import more. The growth of Brazilian fertilizer imports was 345% in quantity between 2000 and 2020, and imports of agricultural and construction machinery tripled in number, between 2020 and 2024, with a significant increase in equipment came from China. In this context, the objective of this article is to analyze, using input-output matrices, the evolution of linkage indices (both forward and backward) and multipliers (for output, income, and employment) of agriculture and agro-based industries in Brazil, considering the years 2000, 2005, 2010, and 2015. These four years allow for the aggregation of input-output matrices, developed by the Brazilian Institute of Geography and Statistics, into 40 sectors and the decomposition of agriculture into three segments: crop production, livestock, and forestry. Agro-based industry (also known as agro-food industries or just agro-industries) is broken down into 12 segments. It is observed that, between the years 2000 and 2015, the forward linkage indices of agriculture sector, considering its all three segments together, on average, fell by 27% (indicating its decreasing importance in fostering agro-based industries, trade, and other economic activities within the country), while its backward linkage indices increased by

42% (noting that agriculture had purchased more industrial inputs, but a significant share of them are imported). The opposite trend has taken place for the aggregated 12 agro-based industries, whose forward linkage index increased, on average, by 18%, while the backward linkage index decreased, on average, by 12% (between 2000 and 2015). For both agriculture and agro-industry sectors, the output, employment, and income multipliers have declined from 2000 to 2015, however in 2015 they were higher for agro-industry sector rather than for agriculture sector, on average. The strong mechanization of agriculture during the first quarter of the 21st century had led to reduce its employment multiplier, on average, by 75% between 2000 and 2015. These aggregated results, however, conceal differences in the behavior of the aforementioned indicators among the three agricultural segments and the 12 agro-industrial segments analyzed in the paper. It highlights the importance of considering specific characteristics within the sectors that make up important shares of the Brazilian agribusiness, particularly within its agriculture and agro-industry sectors when designing policies and programs aimed at ensuring their growths. Especially keeping in mind, there are boom phases followed by downturns in agricultural and agro-industrial commodity prices, which strongly dictate the domestic dynamism of agribusiness, responsible for 1/4 of the Brazilian GDP on average during the years 2021 to 2023.

**Keywords:** agriculture, agro-industry, intersectoral relations, multipliers.