

## Contribution of the forest sector to the Uruguayan economy: A first approach with National Accounts

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**Abstract:** The forest sector development in Uruguay has been based on planted forest areas, mainly with eucalyptus and pine. The Parliament passed the Forestry Law in 1987 and since then the sector has been growing rapidly. The objective of the study is to analyse the contribution of the forest sector in the Uruguayan economy, its evolution between 1997 and 2018 and its distribution in recent years. The research used information from the new National Accounts released by the Central Bank of Uruguay, and, in this framework, the forest sector is studied for the main macroeconomic variables and production. The results show that in the period 1997–2018, while the Uruguayan economy grew 2.6% in constant terms, on average, the forest sector grew 7.6% on average, with peaks in 2007–2008 and 2013–2015. In 2016, the forest production was allocated to exports (46.76%), which surpassed intermediate use (43.05%) after initial operations of the second pulp mill in the country. Furthermore, forest exports represented 10.5% of the country's total exports of goods and services, showing an exporter profile.

**Keywords:** value added; Uruguay; GDP; forest industry; economic impact

The concept of economic impact is related to net changes in the economy in a specified area like forest sector, often related to a new policy or investment project. However, it is important to distinguish between contribution and economic impact, since the difference between the concept of economic impact and economic contribution is not always considered (Watson et al. 2007; Henderson et al. 2017; Li et al. 2019). This differentiation is necessary in order to understand the significance of the results.

Economic contribution refers to the gross changes in a region's existing economy that can be attributed to an industry, an event, or a policy (Watson et al. 2007). This is the quantification of the contribution of an industry that already exists to an economy (Henderson et al. 2017). On the other hand, economic impact refers to the net changes in the economic base of a region that can be attributed to an industry, an event, or a policy. It is usually assessed by a marginal analysis (Watson et al. 2007). Furthermore, Watson et al. (2007)

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define “economic benefit” estimates when the social welfare is included, considering not only market but also nonmarket values.

Uruguay developed its forest sector after the Forestry Law 15939 passed in 1987. The planted forest area increased from 50 000 ha in 1998 to the current total area of 952 755 ha devoted to commercial plantations (Forest Division 2018). The majority of the area is covered with eucalyptus (*E. globulus*, *grandis* and *dunnii*) and with pine (*Pinus taeda*), 606 568 ha and 183 809 ha, respectively. The main domestic market use of eucalyptus plantations is in the pulp industry, woodchip industry, sawmills and plywood factory, and as firewood.

Given the increasing importance of the forestry sector in the Uruguayan economy and its effect on local economies, a discussion on the economic impact or contribution of the forest sector is needed.

In Uruguay, some studies have analysed the impact of the sector or its contribution, but in some of them the terms contribution and impact were used as synonyms (Morales Olmos, Siry 2009; CPA Ferrere 2017). In 2001, a report forecasted that the harvest volume by 2015–2016 would be 12.5 million m<sup>3</sup> and the forest sector would have 25 000 employees. This study assumed that the pulpwood would be exported, and the fiscal balance would be positive (Ramos, Cabrera 2001). The 2011 report found that the forest sector employed 20 000 people, 13 000 of them in silviculture and extraction (Baffico, Michelin 2011).

The objective of this paper is to analyse the contribution of the forestry sector in the Uruguayan economy, its evolution between 1997 and 2018 and its domestic composition in recent years considering the new National Accounts information released by the Central Bank of Uruguay.

## MATERIAL AND METHODS

The System of National Accounts (SNA) is a standardized structure of macroeconomic information designed by the United Nations to compile consistent information by country (United Nations 2021). The period of the analysis was selected considering the successive revisions of the National Accounts and the start of industrial investments in the forestry sector. Uruguay’s National Accounts had used 2005 as a base year, however in 2020 the year 2016 was adopted as a base year in the National Accounts.

The new revision of the National Accounts changing the base year from 2005 to 2016 (Central Bank

of Uruguay 2020) includes the linkages of the sectors in the economy in the Supply and Use tables. The Supply and Use tables show the allocation of goods and services by industry in intermediate and final uses

The National Accounts measurements for the forestry sector are structured according to the International Standard Industrial Classification (ISIC). Firstly, the silvicultural activity includes planting, management of standing forests and harvesting. The final product is roundwood, including industrial roundwood and firewood. This activity includes both specialized nurseries and service companies associated with the activity. Roundwood production is accounted for from planting to harvesting. The Central Bank of Uruguay estimates the production value in each period according to the costs incurred in that time length. Secondly, the forest sector includes manufacturing industries that process industrial roundwood as the main input to obtain wood residuals.

## RESULTS AND DISCUSSION

Considering the 2005 base year revision, in the period 1997–2018, while the Uruguayan economy grew an average of 2.6% in constant terms, the forest sector grew 7.6% on average, with peaks in 2007–2008 and 2013–2015 (Figure 1). During this period, there were two major changes in the pulp industry: in 2007 the Fray Bentos pulp mill with an initial production capacity of 1.2 million t-year<sup>-1</sup> started its activities, while in 2013 the Montes del Plata pulp mill doubled the country’s production capacity. Additionally, other important investments were made in the forestry industry.

According to the National Accounts published by the Central Bank of Uruguay, the GDP of the Uruguayan economy increased by 1.67 times between 2005 and 2018 measured at constant 2005 prices (cumulative increase of 67% in volume), while measured at current prices the GDP increased more than fourfold in the same period (cumulative increase of 330.8%). During this period, the forest sector value added in the economy measured at constant 2005 prices increased almost fourfold (cumulative increase of 295.9% in volume), while its value added measured at current prices increased sixfold (cumulative increase of 524%). During this period, the accumulated growth of the forest sector was higher than

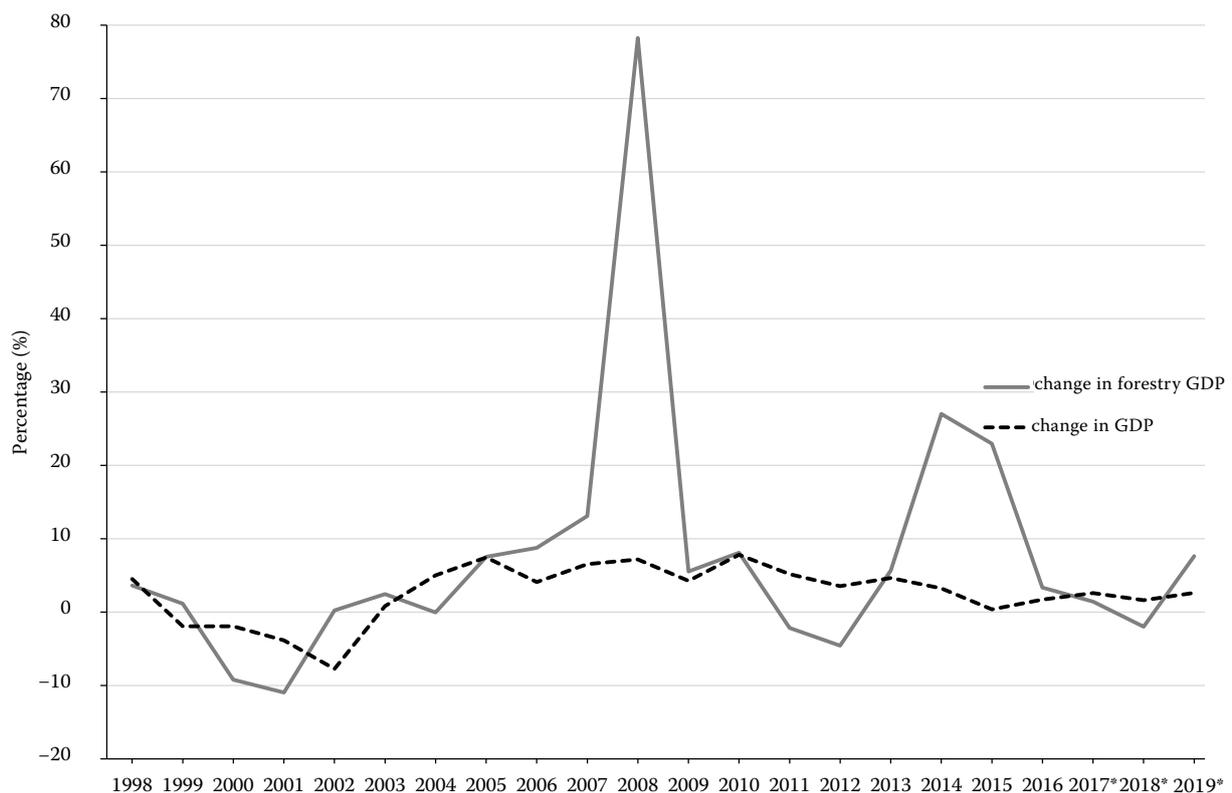


Figure 1. Annual changes in constant terms in GDP and Forest sector GDP

\*preliminary

Source: own elaboration based on Central Bank of Uruguay data; available at: <https://www.bcu.gub.uy/Estadisticas-e-Indicadores/Paginas/Presentacion%20Cuentas%20Nacionales.aspx> (Accessed November 2021)

that of the average of the economy, due to the start of operations of the two pulp mills.

Considering the 2016 base year revision, results show that in 2016, the main market for forest production was exports (46.76%), which surpassed intermediate use (43.05%) after the start of operations of the second pulp mill in the country. In that year, forest exports represented 10.5% of the economy's total exports of goods and services, marking a clear export profile.

In 2016, pulp processing accounted for 51% of production and 49.5% of the sector's gross value added, while silviculture and harvesting accounted for 27.5% of production and 32% of gross value added (Table 1).

In terms of salaries and labour, the highest share is in the primary activities, silviculture and harvesting. In 2016, pulp processing accounted for just 22.5% of remunerations and 11.6% of jobs while silviculture and extraction accounted for 36.5% of re-

munerations and 42.5% of jobs in that year. In terms of average *per capita* remuneration, pulp manufacturing has the highest per capita wages in the sector (higher than the average for the economy), while silviculture and harvesting have the lowest per capita compensation. These results require an in-depth analysis by subsector because in the primary sector the work is outsourced, and in the case of plantations, the activities are seasonal. On the other hand, breaking down by industry, the sawmill and panel industry, due to the characteristics of the industrial process, employs more workers per unit ( $m^3$ ) than the pulp industry (employees per t).

It is necessary to complement the purely economic analyses with others that include the actors' perceptions and the linkages with other sectors. This type of analysis would consider the estimates of "economic benefit" as suggested by Watson et al. (2007) by including market and non-market benefits, e.g. environmental benefits.

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Table 1. Production, Income Generation and Employment accounts (year 2016, in million USD, except Employment account)

Variables	Silviculture	Sawmills and wood products	Pulp	Printing	Total forest sector
Production	932.6	483.5	1 730.5	239.1	3 385.8
Intermediate consumption	541.4	353.7	1 125.6	142.0	2 162.7
Value added	391.2	129.8	604.9	97.1	1 223.1
Remunerations	115.0	67.1	72.9	69.3	324.3
Taxes net from subsidies	-3.7	-4.5	-1.0	0.3	-8.9
Gross operating surplus	255.4	47.2	528.2	14.2	845.0
Gross mixed income	24.5	20.0	4.8	13.3	62.5
Number of employees	311.3	164.9	95.6	157.7	729.5
Employers and self-employed	157.1	70.5	21.4	29.2	278.3
Total labor	468.5	235.3	117.1	187.0	1 007.8

Source: own elaboration based on Central Bank of Uruguay data (Central Bank of Uruguay, 2020)

## CONCLUSION

The analysis of the forest sector contribution to GDP allows taking informed decisions to design public policies in Uruguay. The contribution of the Uruguayan forest sector to the economy measured using National Accounts shows its importance in the country's economy over the last two decades. The Uruguayan forest sector benefited from subsidies and tax exemptions and grew based on the planning of the location of forestry plantations, zoning of forestry priority areas in the country and establishing commercial plantations. Currently, there are more than one million hectares planted, but industrial development is uneven. While the pulp sector has developed rapidly, with the installation of two modern foreign-owned mills and the construction of a third, the other forest product subsectors have grown more heterogeneously.

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