From Import Dependence to Industrial Reintegration: An IO Assessment of Resin Production Revival in Portugal

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Portugal was once the worldâ€™s leading producer of natural resin extracted from Pinus pinaster, reaching 140,000 tons annually in the 1970s. Today, production stands at roughly 6,000â€“7,000 tons, while the domestic transformation industry depends heavily on imported raw resin - primarily from Brazil - creating a structural trade deficit and exposing the sector to international price volatility. In the broader context of European industrial decarbonization and the transition toward bio-based feedstocks, natural resin can be positioned as an industrial bioeconomy asset. Accordingly, revitalizing resin tapping - by aligning resin supply with international technical and environmental requirements and by promoting R&D geared toward new applications - may be understood as part of an integrated strategy combining forest policy, industrial policy, territorial cohesion, and bioeconomy objectives.

This paper evaluates the macroeconomic implications of revitalizing domestic resin production through a structural inputâ€“output (IO) framework. Using the highly disaggregated national IO matrix (431 products; 125 industries), we simulate alternative technological and industrial scenarios over a medium-term horizon. A key contribution of the study lies in the integration of primary data collected through interviews and a targeted industry survey. Based on this survey, we derive a resin-specific collection sector and change the industry coefficients that link raw resin inputs to downstream value-added products. This allows us to endogenize the response of the processing industry to increased domestic availability of resin and to construct a sectoral adjustment that is not explicitly identified in standard IO classifications.

Two technological pathways are modeled. Scenario 1 assumes expansion of the traditional extraction method through increased resinized area (from <25,000 ha to 45,000 ha) and operational efficiency improvements, generating up to 36,000 tons annually. Scenario 2 introduces mechanized extraction, increasing productivity and quality (higher market price), expanding area to 65,000 ha and generating up to 52,000 tons annually. In both cases, we consider two variants: (A) pure import substitution and (B) import substitution combined with endogenous expansion of the downstream transformation industry.

Results reveal strong multiplier effects. Under Scenario 1A (traditional expansion with import substitution), total output increases by â‚¬83.6 million and value added by â‚¬52.8 million, generating 1,624 full-time equivalent jobs and reducing net imports by â‚¬40.9 million. When downstream transformation expands (Scenario 1B), total output rises to â‚¬192.4 million, value added to â‚¬83.3 million, and employment to 2,045 jobs, although additional industrial inputs partially offset the initial import reduction. The â€œmechanizedâ€• pathway produces larger effects. Scenario 2A generates â‚¬135.0 million in output and â‚¬92.9 million in value added, with a net import reduction of â‚¬69.1 million and 1,801 jobs. The fully integrated Scenario 2B reaches â‚¬321.9 million in total output, â‚¬163.3 million in value added, and 2,641 jobs. In these integrated scenarios, indirect industrial linkages become structurally relevant, particularly in energy, transport, plastics, and wholesale trade, while induced effects strongly stimulate household-oriented sectors such as retail, housing, and services.

Beyond scale effects, the results demonstrate that the composition of domestic sourcing critically alters multiplier propagation. Replacing imported resin with domestic production shifts value creation upstream into forestry and downstream into manufacturing, strengthening intersectoral linkages. The analysis therefore captures not only a scale shock but also a structural transformation of the technical coefficient matrix.

Policy implications are threefold. First, resin revival can contribute simultaneously to rural

employment, industrial competitiveness, and trade balance improvement. Second, technological upgrading (mechanization) significantly enhances value-added intensity without proportionally increasing labor costs. Third, vertical integration of the value chain is essential to maximize multipliers; without downstream expansion, part of the potential impact remains unrealized.
The paper contributes methodologically by combining IO structural modification with survey-based parameterization of an under-identified bio-based sector. Substantively, it provides evidence that small primary sectorsâ€”when embedded in industrial value chainsâ€”can generate macroeconomically meaningful effects and support strategies of bioeconomy development and strategic import substitution.