

Cointegration analysis of Austrian wood and bioenergy markets

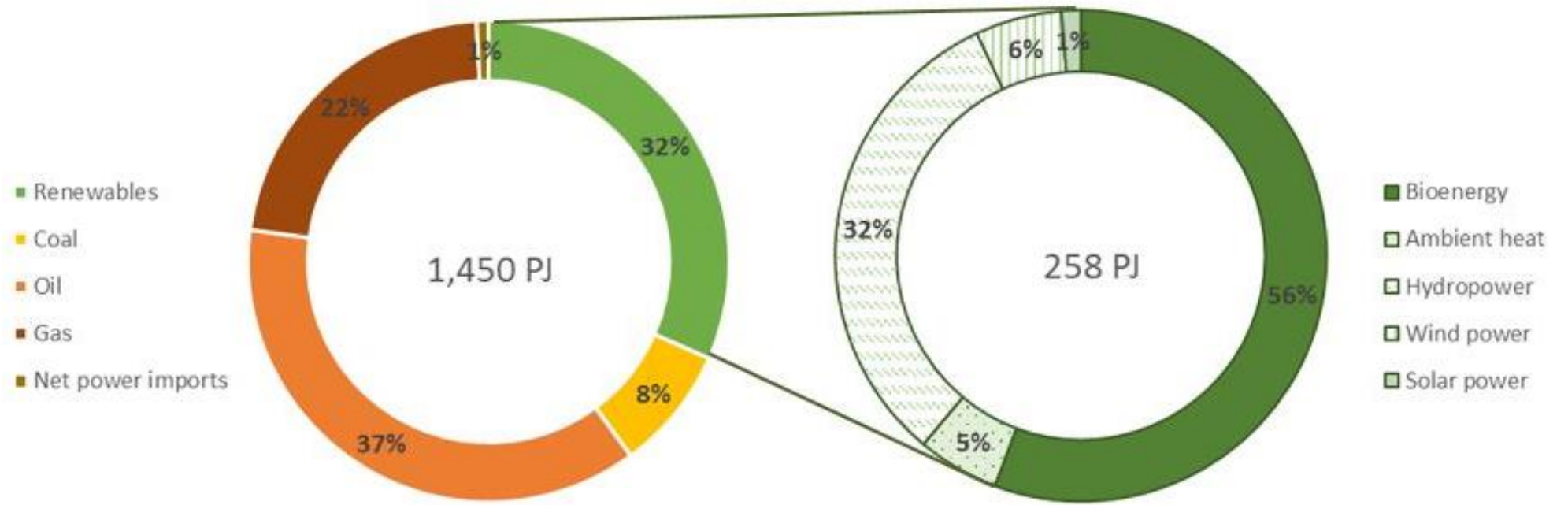
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Bioenergy in Austria

- Wood: important energy source in Austria

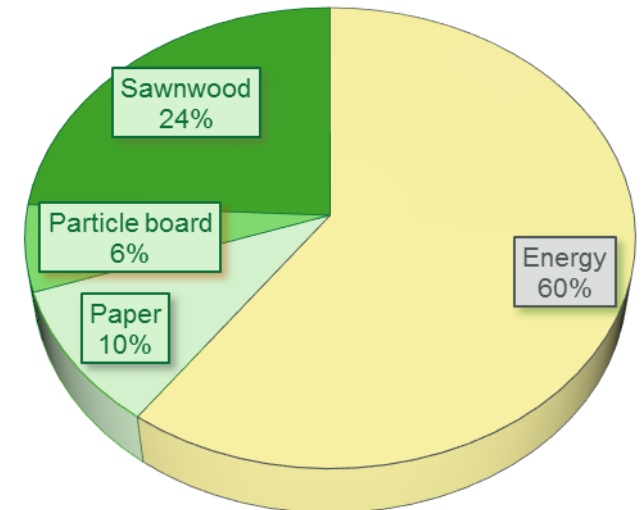
Energy consumption in 2019



Data source: BMK, 2020

Competition for woody biomass: energy vs. material

- Wood end utilization 2018: 42.9 million m³ roundwood equivalent
 - about 60% bioenergy and 40% wood products
- Austrian legislation „Erneuerbaren-Ausbau-Gesetz“ (EAG)
 - increase the power consumption from biomass by 3.6 PJ until 2030
- New technologies are likely to enter bioenergy markets, for example wood gasification + synthesis to BioSNG or Fischer Tropsch liquids

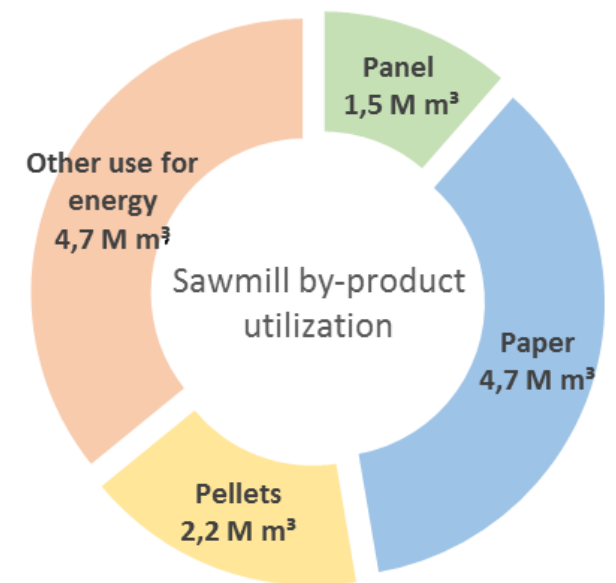
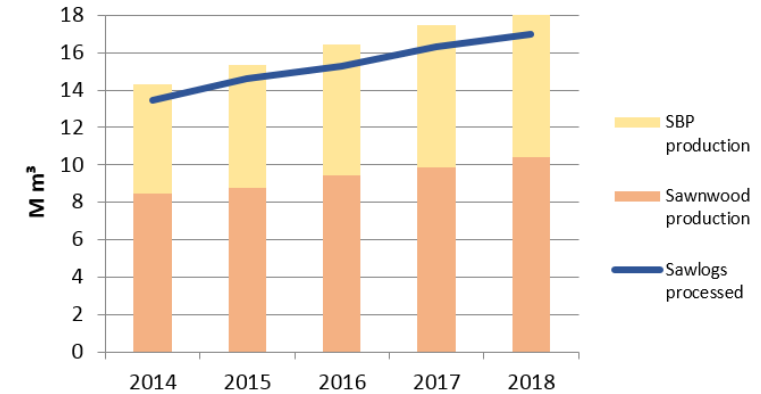


By-product utilization

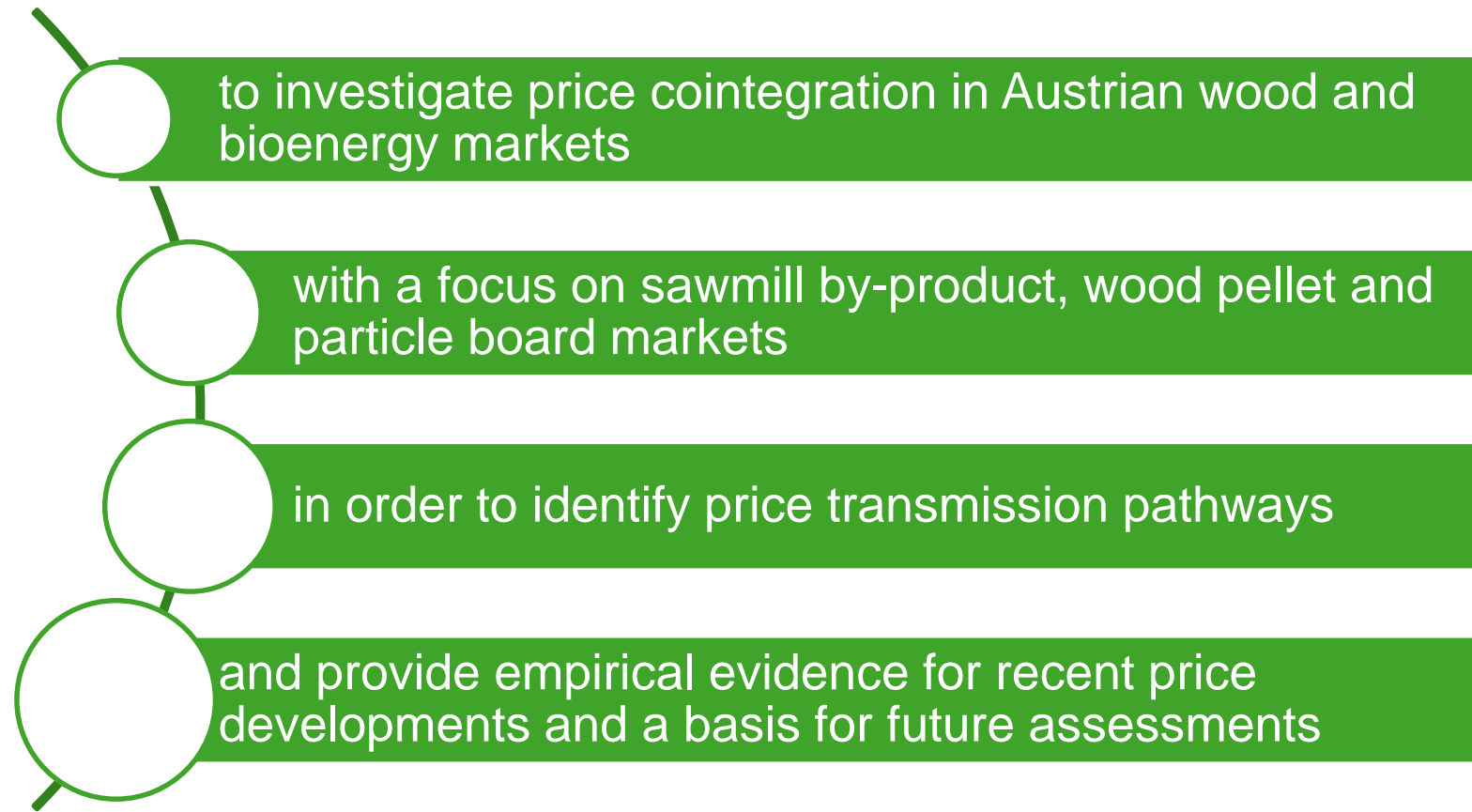
- Increasing demand for wood as raw material
 - by energy and material sector
 - intensification of competition
 - stimulation of by-product utilization

- **What are the implications on raw material and product prices?**

- **How are prices interlinked?**



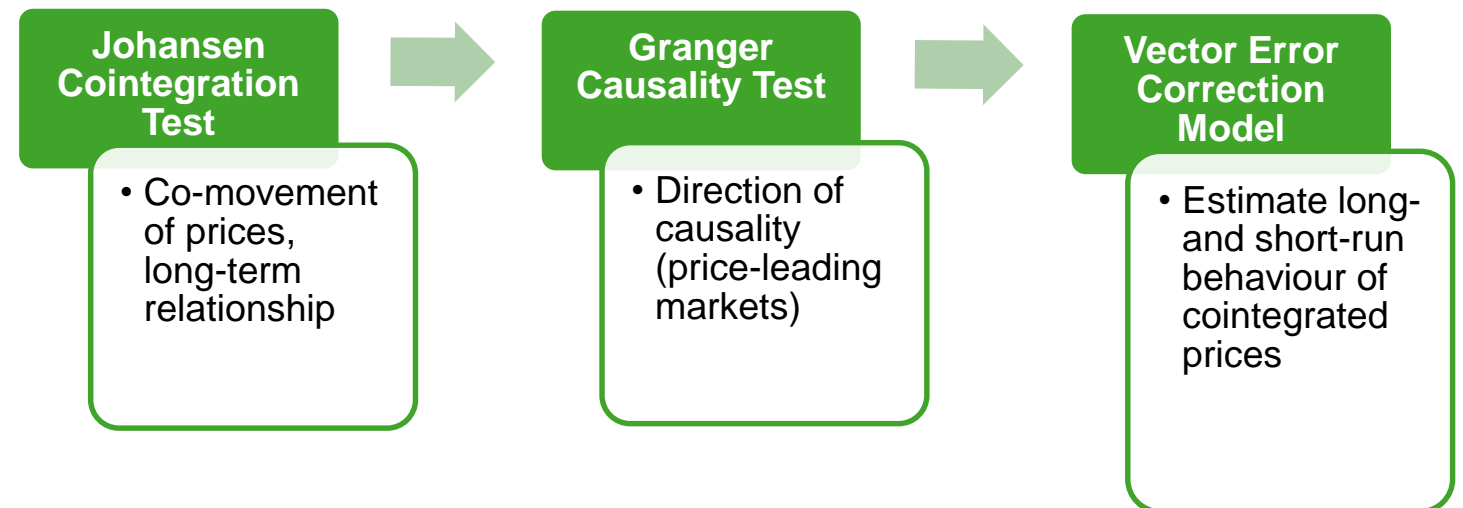
Research objectives

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- to investigate price cointegration in Austrian wood and bioenergy markets
 - with a focus on sawmill by-product, wood pellet and particle board markets
 - in order to identify price transmission pathways
 - and provide empirical evidence for recent price developments and a basis for future assessments

Data and methods

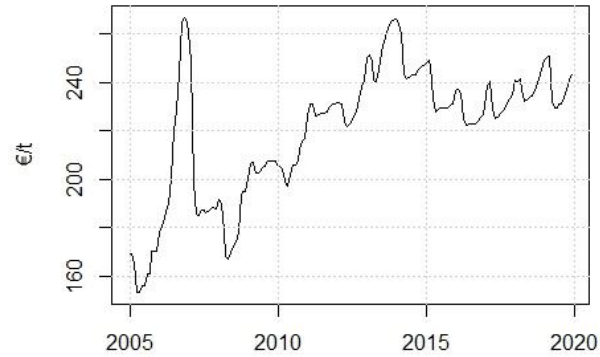
- Monthly price data from January 2005 to November 2019
 - roundwood: sawlogs, pulpwood
 - sawmill by-products: wood chips, sawdust
 - products: wood pellets, particle board
 - fossil resources: crude oil

- Statistical analysis in R:

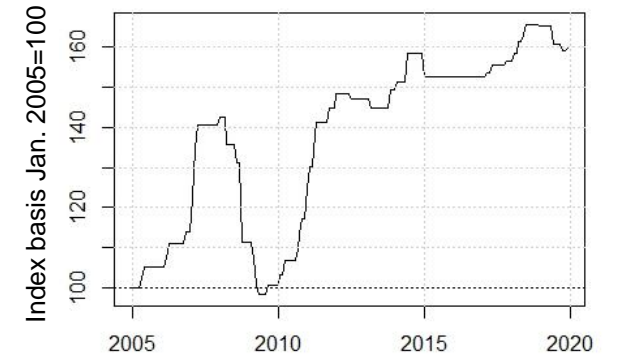


Results – price developments

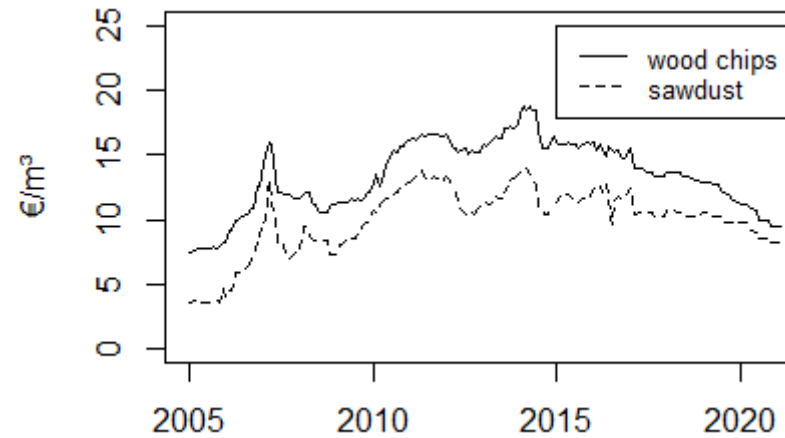
wood pellets



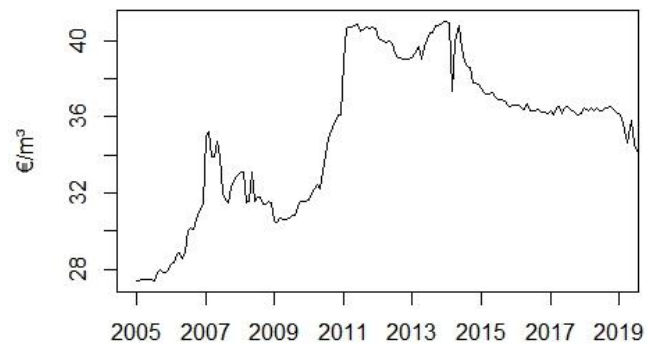
particle board



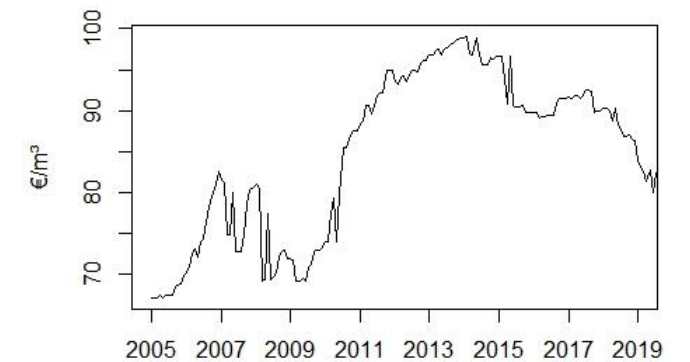
sawmill by-products



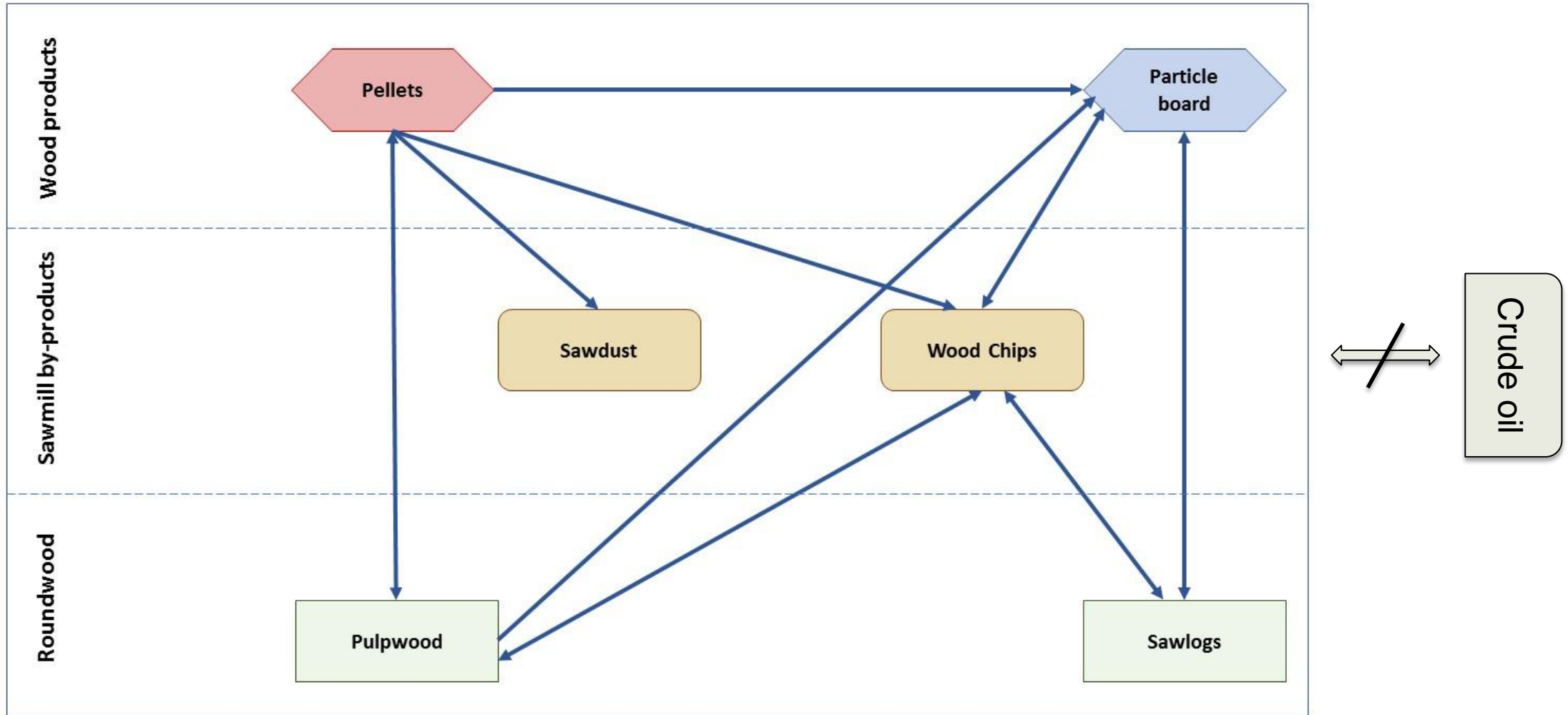
pulpwood



sawlogs



Results – price cointegration



Results - Vector Error Correction Models

- **Sawdust prices:** modelled with wood pellet prices
 - adapt faster to the long-term balance after short-term deviations
 - 23.5 % of the balance regained each month

- **Wood chip prices** are cointegrated in several ways and thus affected by several markets (roundwood, pellets, particle board)
 - adapt slower after deviations
 - 7.9 % of the balance regained each month

Results – summary & implications

- Complex cointegration within wood markets, but independent from crude oil market
- **Wood pellets**
 - politically promoted by RED & national policies
 - residential heating sector not dependent on general economic developments
 - less affected by economic crises
 - price decisive for sawmill by-products
- **Sawdust**
 - mainly determined by wood pellet prices, thus effects of Covid-19 crisis better mitigated
- **Wood chips**
 - important for material and energy markets
 - cointegrated with several markets, thus stronger affected by the crisis
 - need more time to recover from price shocks

Conclusion

- Cointegration approach: allows to provide empirical evidence about price cointegration and price transmissions within wood and bioenergy markets and thus
 - helps to assess effects of policies and market shocks in the bioenergy sector
 - supports the efficient design of policies
- Raw material markets can benefit from the promotion of products
 - wood pellet market is less affected by the Covid-19 crisis and thus can have a stabilizing effect on sawdust market
- Complex interlinkages and price transmissions can both alleviate and reinforce effects like price shocks to the forest-based sector in total

Thank you for your attention!

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