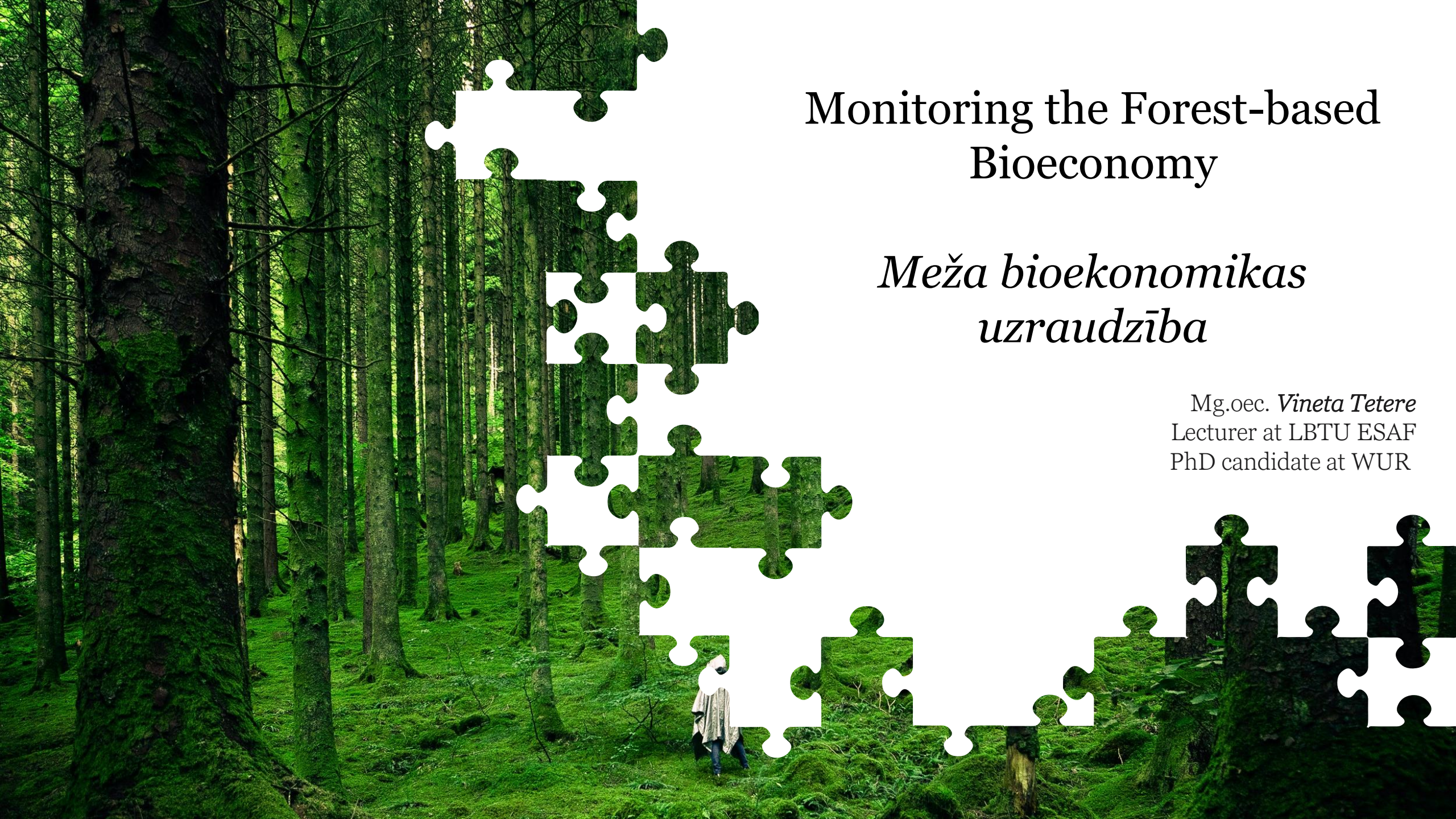

Monitoring the Forest-based Bioeconomy

Meža bioekonomikas uzraudzība

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Goal and Research questions

Goal: to determine the economic and environmental performance of the forest-based bioeconomy (FBB) in Latvia.

Research questions:

1. What are the characteristics of the FBB in Latvia?
2. How can input-output analysis be used to measure the contribution of the FBB to GDP (GVA), employment and CO_2 emissions?
3. What is the contribution of the FBB to GDP (GVA), employment and CO_2 emissions in Latvia?

Forest-based bioeconomy - the direct and indirect production needed to enable the final demand of forest-based products (FBP).

Forest-based products I

- products of forestry, logging and related services (CPA code A02);
- wood and products of wood and cork, except furniture; articles of straw and plaiting materials (CPA code C16);
- *furniture and other manufacturing (CPA codes C31 and C32).*

Forest-based products II

- 'Forestry and logging' (code A02);
- 'Manufacture of wood of products of wood and cork, except furniture; articles of straw and plaiting materials' (code C16);
- *'Manufacture of paper and paper products' (code C17).*

Value added, employment, and emissions directly related to the production of FBP I and FBP II in Latvia, 2015

Indicators	% of value added		% of employment		% of CO_2 emissions	
	FBP I	*FBP II*	*FBP I*	*FBP II*	*FBP I*	*FBP II*
Forest-based products	*5*	*4.4*	*5.8*	*4.9*	*3.3*	*3.2*
Rest of the economy	*95*	*95.6*	*94.2*	*95.1*	*96.7*	*96.8*
Total	*100*	*100*	*100*	*100*	*100*	*100*

Source: Latvijas statistikas portals

Methods

- The ***IO model*** was developed by Leontief in the late 1930s to analyse the economy as a whole and to study the interdependence among the different industries in an economy, since the output of one industry can serve as an input for another industry directly and indirectly (Miller and Blair, 2009).

$$x_k = (I - A)^{-1} f_k$$

$$z_{k,l} = v_l \, x_k$$

- An **IO method** developed by Harthoorn (1989) makes it possible to calculate the forest-based bioeconomy by isolating the relevant inter-industry transactions from an IO table.

$$y = (\hat{s}_0(I - \tilde{A})^{-1} + (I - \hat{r}_0\tilde{A}\hat{r}_0)^{-1}\hat{r}_0\tilde{A}\hat{s}_0(I - \tilde{A})^{-1} + \hat{s}_1(I - \hat{r}_0\tilde{A}\hat{r}_0)^{-1} + (I - \hat{r}_1\tilde{A}\hat{r}_1)^{-1}\hat{r}_1\tilde{A}\hat{s}_1(I - \hat{r}_0\tilde{A}\hat{r}_0)^{-1}f$$

Scenarios

- IO model (*Leontief*):

VA, employment and CO_2 emissions are linked to the final demand of FBP I and other products that use inputs from FBP I.

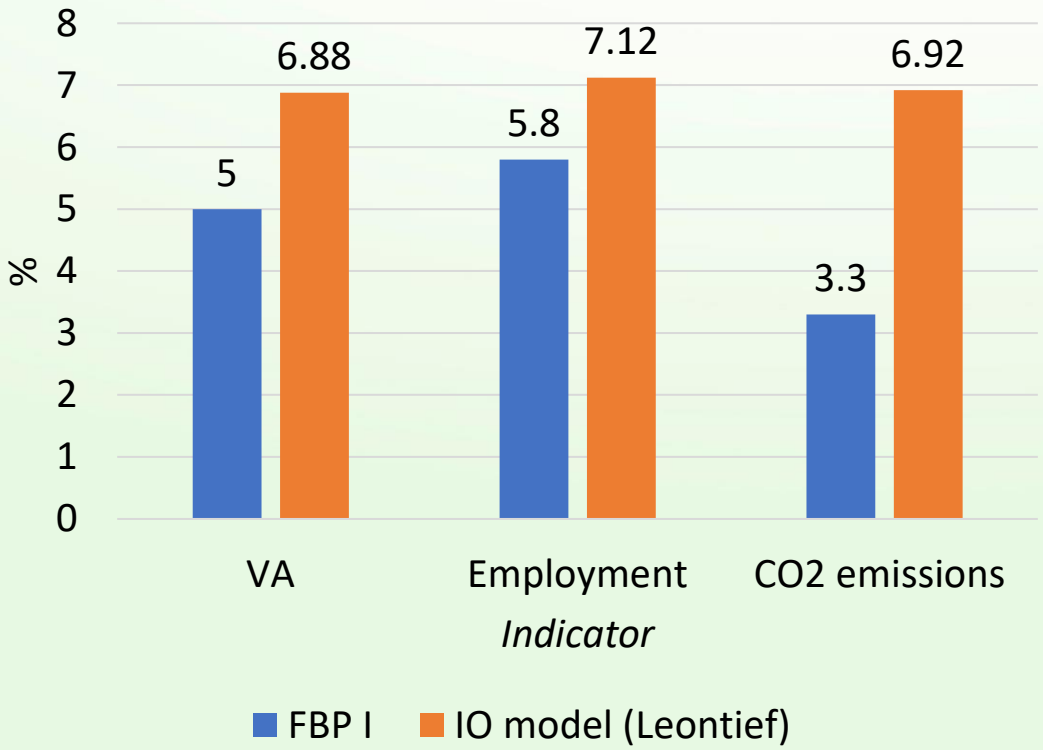
- IO method (*Harthoorn*):

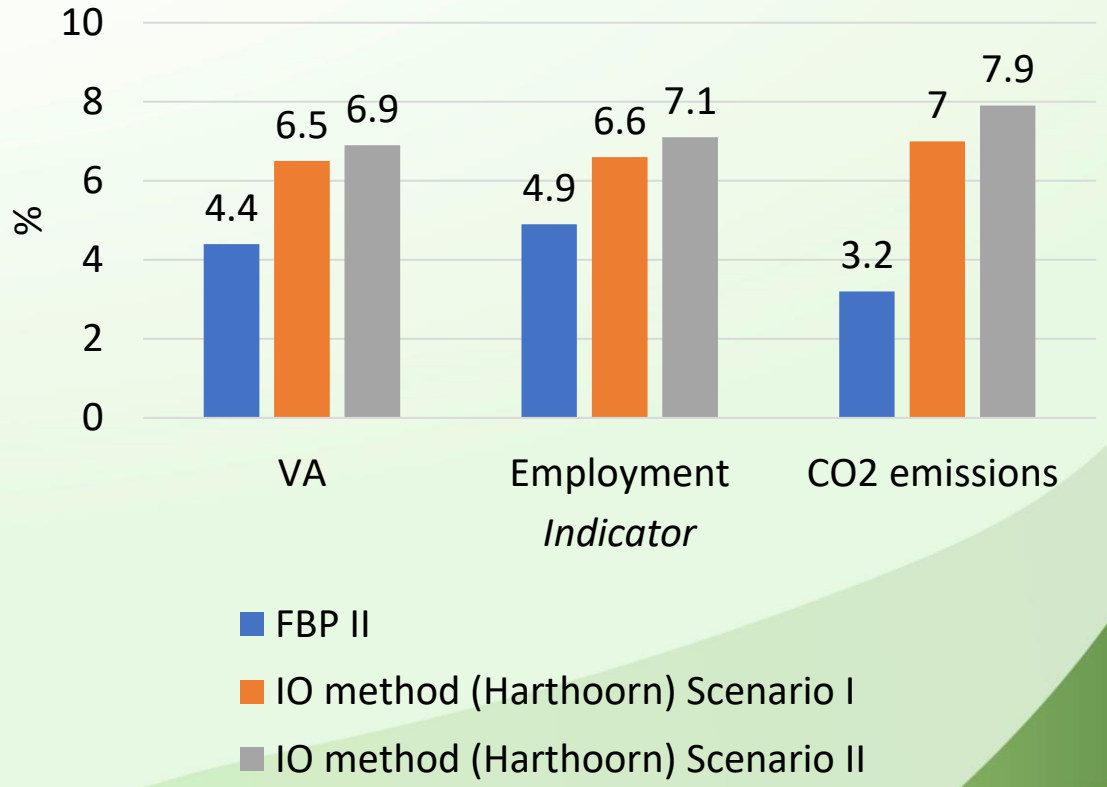
Scenario I - the forest-based bioeconomy is comprised of FBP II (A02+C16+C17).

Scenario II - in addition to FBP II, also all other industries that process outputs of A02 are included, but only partially. The extent to which they are assumed to be processing these outputs is assumed to be equal to the share of A02 in their total intermediate input demand.

Direct and indirect backward linkages of these industries are included in both scenarios.

VA, employment and CO_2 emissions of FBB: results of two models compared





Conclusions

1. No common approach for measuring a FBB exists.
2. The results largely depend on the use of the IO-model and the scenarios defined.
3. The model is a descriptive tool, and economic behavior or policies that could influence the outcomes are not included.
4. Outcomes can differ between years.
5. Forests and the FBB have many more functions than the ones investigated in this research.
6. The forestry and logging is a relatively small industry, while the FBB is quite large.
7. The processing of forestry products is important in terms of value added, employment and CO_2 sequestration but only in C16 and C17.

Thank You
for Your attention!