EMPLOYMENT TRENDS IN THE CROATIAN WOOD INDUSTRY AND FORESTRY

Maja Moro, Darko Motik, Andreja Pirc Barčić, Ksenija Šegotić, Branko Liker

INTRODUCTION

This paper focuses on an analysis of labour resources in the Croatian wood industry and forestry. On the basis of established values in the period 1996 - 2012, the paper discuss a possibility to predict employment trends in the sector.

Intense competition, which comes as a result of globalization and the recently entry into the full membership of the European Union, leads us to the necessity of looking at the current market situation, in order to predict the situation in the future.

This paper discuss a possibility to predict the number of employees in Croatian wood industry sectors, on the basis of established values in the period 1996 - 2012. Because of turbulences in this market and the length of analyzed time series the prediction is limited to the year 2020.

MATERIAL AND METHODS

Analysis follows the time course of an employment in the Croatian wood industry sectors for period 1996 -2012.

The data were gathered from database of *Croatian's State Bureau of Statistics* and *Ministry of Finance and Financial Agency*. The data are shown in Table 1.

Table 1. Number of employees per year in the Croatian wood industry sectors for period 1996 – 2012

Year	Furniture manufacturing (EFM)	Wood processing (EWP)	Total (ETL)
1996	12.641	11.223	23.864
1997	12.116	11.577	23.693
1998	10.973	11.908	22.881
1999	11.515	11.287	22.802
2000	11.611	11.495	23.106
2001	11.627	10.833	22.460
2002	11.719	11.376	23.095
2003	10.348	11.780	22.128
2004	10.563	11.584	22.147
2005	10.851	11.404	22.255
2006	10.638	12.014	22.652
2007	11.386	12.842	24.228
2008	11.603	12.819	24.422
2009	9.637	11.501	21.138
2010	9.676	11.050	20.726
2011	9.357	10.839	20.196
2012	8.887	11.072	19.959

Variable **EWP** represent the number of employees per year in Wood Processing (sector C16).

Variable **EFM** represent the number of employees per year in Furniture Manufacturing (sector C31).

Variable **ETL** represent the number of employees per year in Wood processing and Furniture manufacturing together, for period 1996 – 2012.

RESULTS AND DISCUSSION

Average number of employees in both sectors is approximately equal for analized period, 10.891 workers in Wood processing and 11.565 workers in Furniture manufacturing. The coefficients of variation of the number of employees for all variables are relatively small (EWP 9,56%; EFM 5,03% and ETL 5,89%), so the arithmetic mean is representative indicator for the number of employees in the observed sectors. Results are given in Table 2.

Table 2. Descriptive statistics for the number of employees for period 1996 – 2012

Descriptive Statistics	Variable		
	Furniture manufacturing (EFM)	Wood processing (EWP)	Total (ETL)
Valid N	17	17	17
Minimum	8.887	10.833	19.959
Median	10.973	11.495	22.652
Maximum	12.641	12.842	24.422
Sum	185.148	196.604	381.752
Mean	10.891	11.565	22.456
Std.Dev.	1.041	581	1.323
Coef.Var. (%)	9,56	5,03	5,89
Confidence -95%	10.356	11.266	21.776
Confidence +-95%	11.426	11.864	23.136

The basic indices ($I_{b=2009}$) for all variables are presented with a common reference year and belonging rates of change ($S_t = I_{b=2009} - 100$), also chain base index (V_t) and belonging rates of change ($S_t^* = = V_t - 100$).

Results of these analysis for the number of employees in Wood processing (EWP) and for the number of employees in Furniture manufacturing (EFM) are given in folowing tables 3 and 4.

Table 3. Employment indices and rates of change for Wood processing for period 1996 – 2012

Year	EWP	$I_{b=2009}$	S_t (%)	V_t	S_t* (%)
1996	11.223	97,6	-2,4	-	-
1997	11.577	100,7	0,7	103,2	3,2
1998	11.908	103,5	3,5	102,9	2,9
1999	11.287	98,1	-1,9	94,8	-5,2
2000	11.495	99,9	-0,1	101,8	1,8
2001	10.833	94,2	-5,8	94,2	-5,8
2002	11.376	98,9	-1,1	105,0	5,0
2003	11.780	102,4	2,4	103,6	3,6
2004	11.584	100,7	0,7	98,3	-1,7
2005	11.404	99,2	-0,8	98,4	-1,6
2006	12.014	104,5	4,5	105,3	5,3
2007	12.842	111,7	11,7	106,9	6,9
2008	12.819	111,5	11,5	99,8	-0,2
2009	11.501	100,0	0,0	89,7	-10,3
2010	11.050	96,1	-3,9	96,1	-3,9
2011	10.839	94,2	-5,8	98,1	-1,9
2012	11.072	96,3	-3,7	102,1	2,1

Table 4. Employment indices and rates of change for Furniture manufacturing for period 1996 – 2012

Year	EFM	$I_{b=2009}$	S_t (%)	V_t	S_t* (%)
1996	12.641	131,2	31,2	-	-
1997	12.116	125,7	25,7	95,8	-4,2
1998	10.973	113,9	13,9	90,6	-9,4
1999	11.515	119,5	19,5	104,9	4,9
2000	11.611	120,5	20,5	100,8	0,8
2001	11.627	120,6	20,6	100,1	0,1
2002	11.719	121,6	21,6	100,8	0,8
2003	10.348	107,4	7,4	88,3	-11,7
2004	10.563	109,6	9,6	102,1	2,1
2005	10.851	112,6	12,6	102,7	2,7
2006	10.638	110,4	10,4	98,0	-2,0
2007	11.386	118,1	18,1	107,0	7,0
2008	11.603	120,4	20,4	101,9	1,9
2009	9.637	100,0	0,0	83,1	-16,9
2010	9.676	100,4	0,4	100,4	0,4
2011	9.357	97,1	-2,9	96,7	-3,3
2012	8.887	92,2	-7,8	95,0	-5,0

The average rate of change for the number of employees in Wood processing for period 1996 - 2012 was negative (-0,09%), also as the average rate of change for the number of employees in Furniture manufacturing (-2,18%).

For the number of employees in the both wooden sectors (ETL), the basic indices ($I_{b=2009}$) are shown in Figure 1, and the chain indices (V_t) in Figure 2.

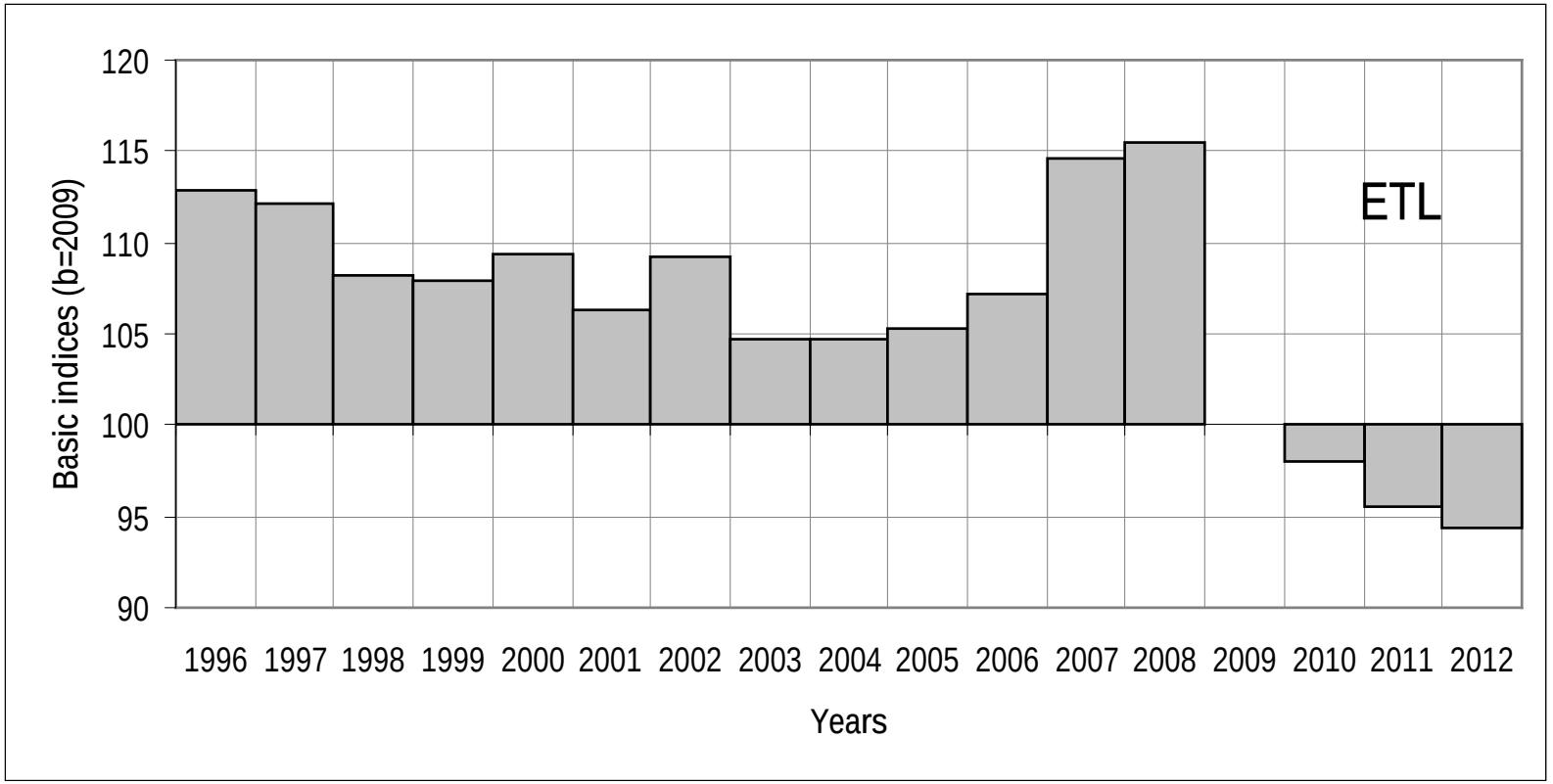

Figure 1. Basic indices for the number of employees in whole wooden sector for period 1996 – 2012

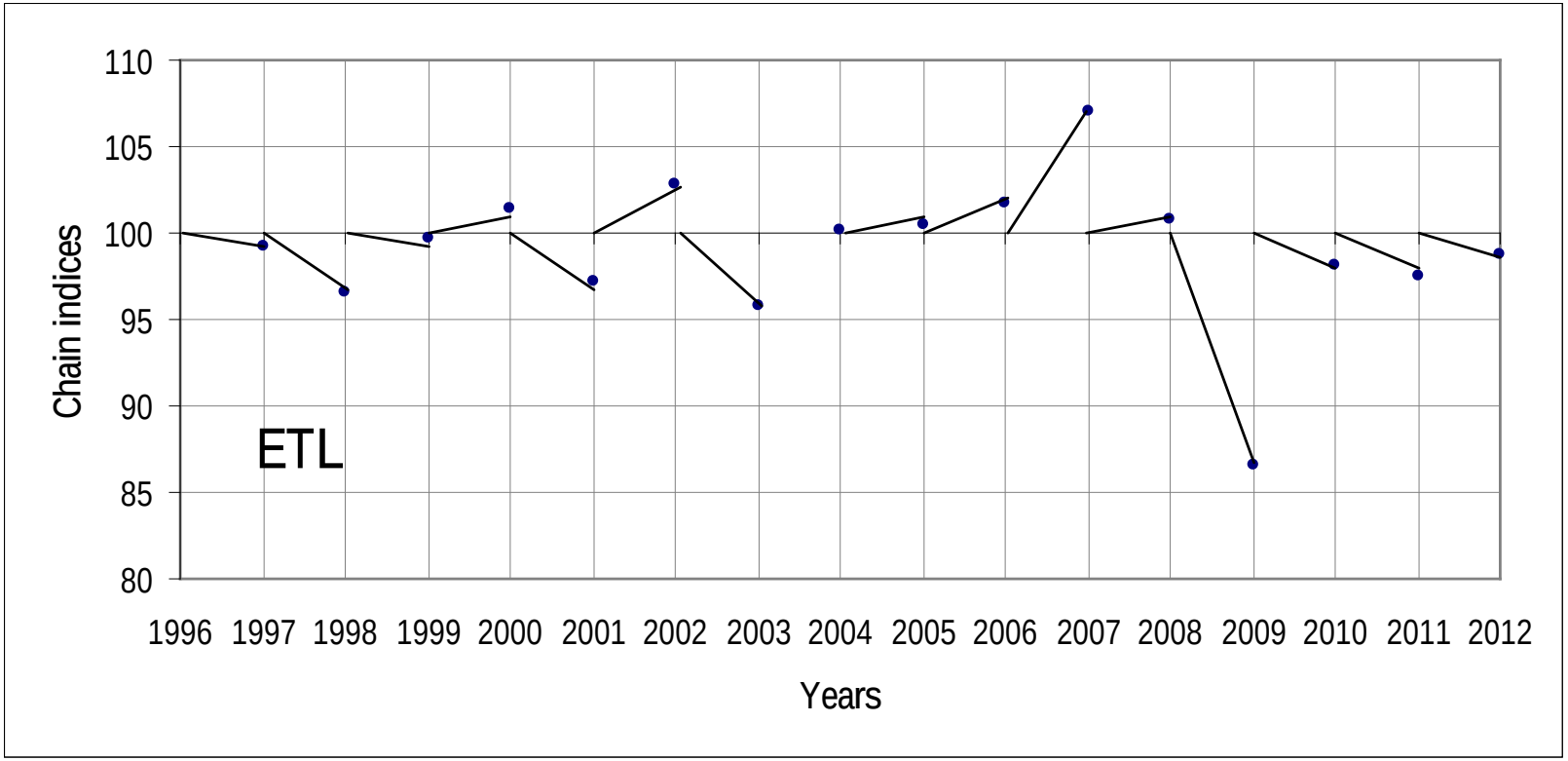

Figure 2. Chain indices for the number of employees in whole wooden sector for period 1996 – 2012

The average rate of change for the number of employees in Wood processing and Furniture manufacturing (ETL) for period 1996 - 2012 was also negative (-1,11%).

Based on the average rates of change for EWP, EFM and ETL in the observed period, models A for prediction of future values of the number of employees in Wood processing and Furniture manufacturing were developed.

Correlation analysis to determine the degree of correlation between the values of the number of employees as dependent variables, and time (***t***) as independent variable was used for models B. In all models, ***t*** is mark for the time, where t=0 compared to year 1996, ... , t=16 to year 2012, etc. Constructed models A and models B for predicting the future values of the number of employees in Croatian wood sectors are shown in Table 5.

Table 5. Models A and models B for calculating the future number of employees in Croatian wood sectors

Wood industry sector	Model A	Model B
Wood processing (EWP)	$A_1(t) = 0,999^t \cdot 11223$	$B_1(t) = 4,34 \cdot t + 11530$
Furniture manufacturing (EFM)	$A_2(t) = 0,978^t \cdot 12641$	$B_1(t) = -168,95 \cdot t + 12243$
Total (ETL)	$A_3(t) = 0,989^t \cdot 23864$	$B_1(t) = -164,61 \cdot t + 23773$

The predicted values of the number of employees in Wood processing using model A and model B, are graphically compared in Figure 3.

In Figure 4 are compared the predicted values in Furniture manufacturing.

In Figure 5 are compared the predicted values for whole wooden sector.

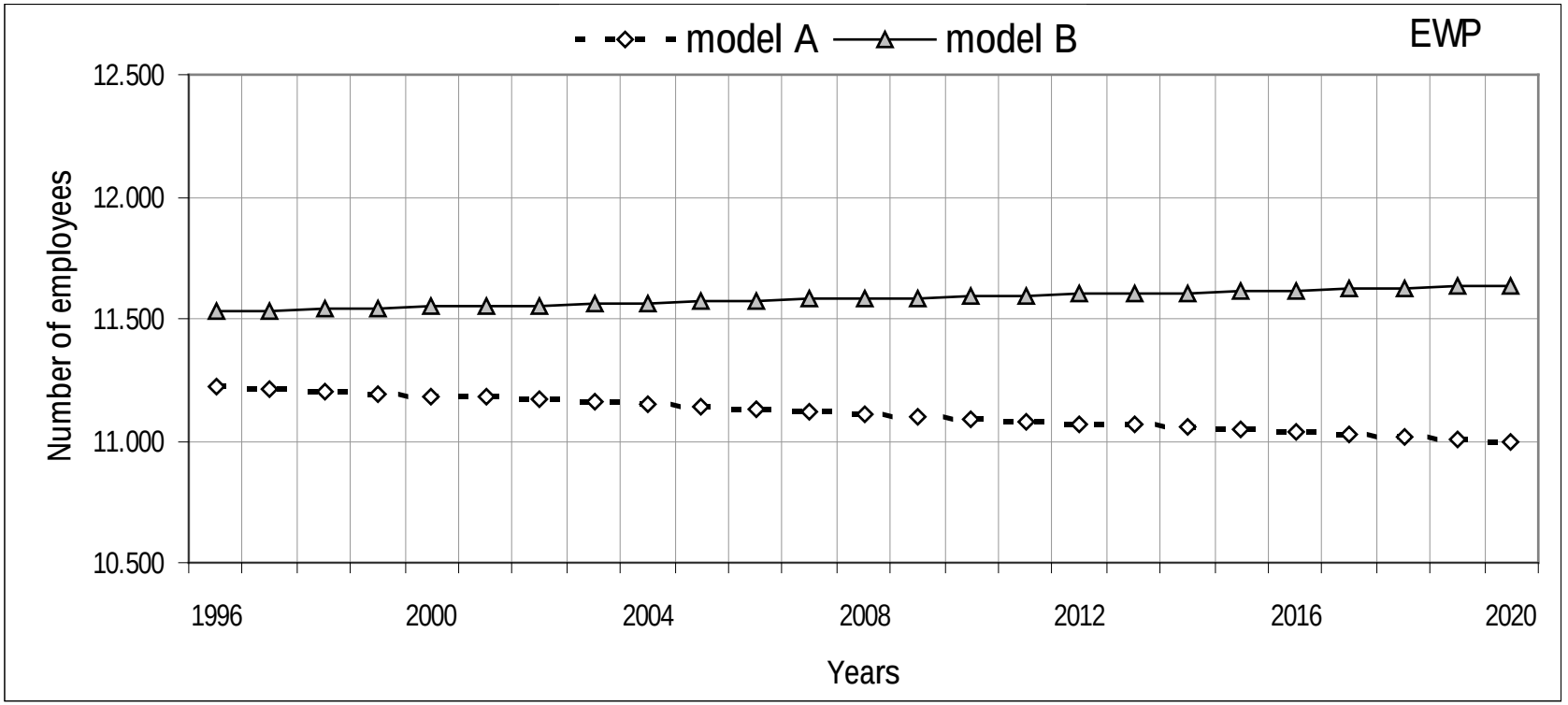

Figure 3. Comparison of the predicted values of the number of employees in Wood processing

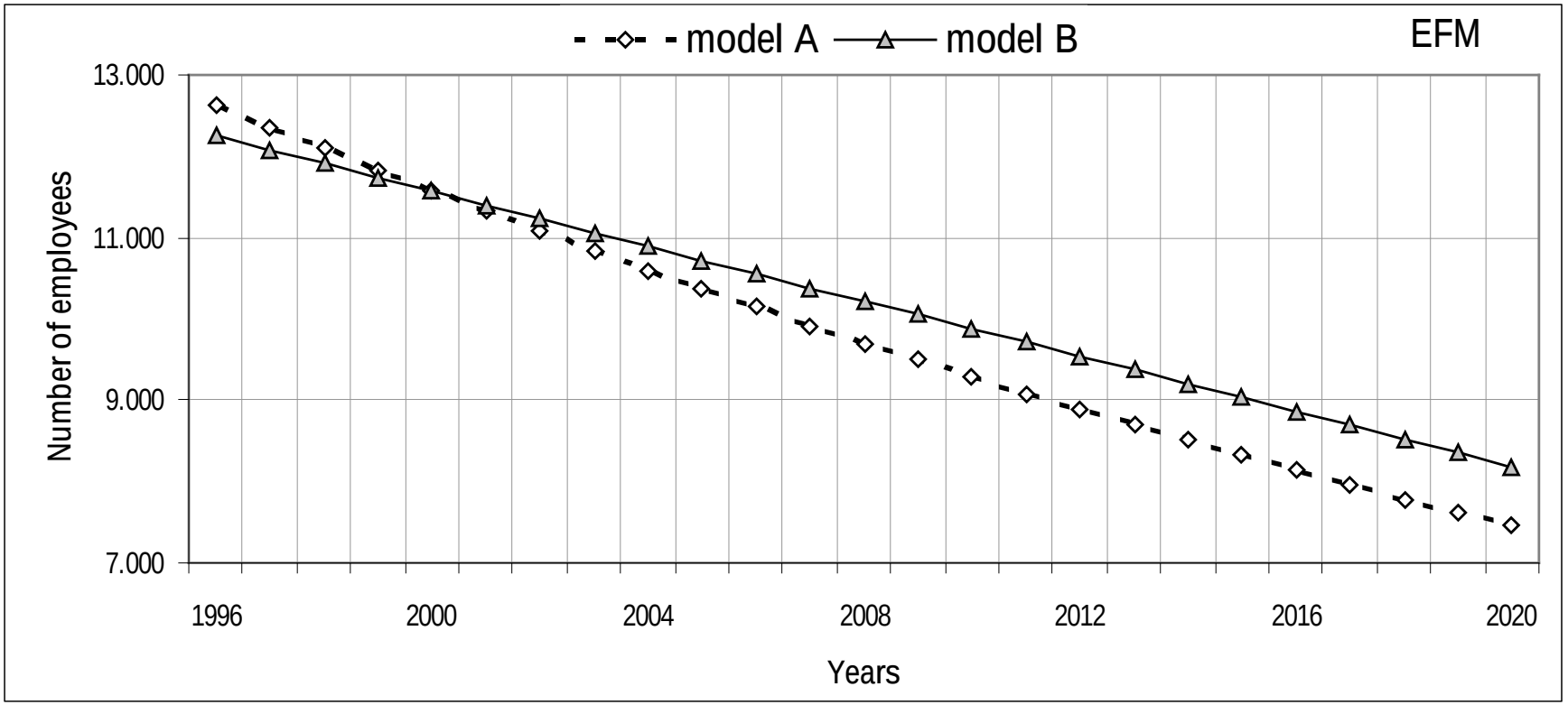

Figure 4. Comparison of the predicted values of the number of employees in Furniture manufacturing

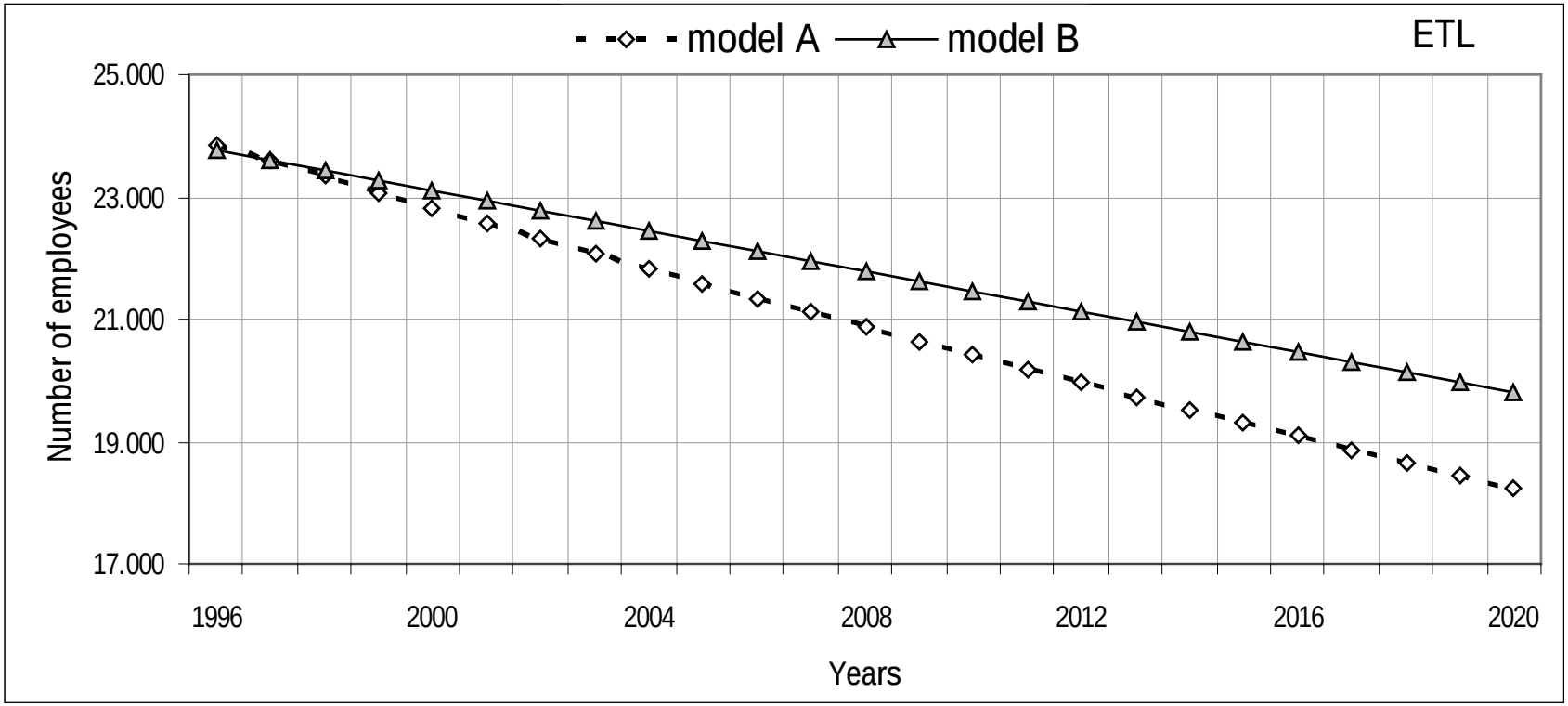

Figure 5. Comparison of the predicted values of the number of employees in whole wooden sector

CONCLUSION

Assuming that the models for predicting the number of employees satisfy all statistical and theoretical terms, constructed models A and B could become a great help for a future actions.

Using time series models for forecasting the number of employees in the future, companies in the wood-based industry will be able to define the future business strategy.

THANK YOU ALL FOR YOUR ATTENTION

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