

The face-to-face auction of valuable assortments of hardwood in the Czech Republic: A history and current state

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Abstract: Face-to-face auctions of valuable timber assortments have operated regularly in the Czech Republic since 2015, but their development and market role have not previously been quantified. This study analysed 426 aggregated auction records from 2015–2025 and examined temporal trends in recorded auction volume and realised auction prices, seasonal distribution, species-specific offered volumes and the relationship between auction prices and comparable Czech national oak prices. Across the completed 2015/2016–2024/2025 seasons, recorded auction volume increased from 1 544.21 m³ to 14 681.95 m³, with an estimated mean increase of 1 426 m³ per season and 85.8% of the variation explained by the fitted trend. Q1 accounted for 82.1% of the combined Q4–Q1 recorded auction volume, and the quarterly difference was significant ($P = 0.002$). Significant upward trends were detected in total recorded auction volume and in the species-specific offered volumes of oak and larch, whereas no significant monotonic trends were detected in inflation-adjusted realised auction prices. Oak (*Quercus* sp.) accounted for 66.1% of the total volume offered, followed by European larch (*Larix decidua* Mill.; 17.4%) and European ash (*Fraxinus excelsior* L.; 8.6%). Rare admixed species occurred only sporadically, providing insufficient evidence of systematic price premiums. Inflation-adjusted realised auction prices for oak were strongly associated with comparable Czech national mean prices (Pearson's $R = 0.839$; $P < 0.001$), although this relationship does not establish causality. Czech face-to-face auctions therefore represent a growing but specialised sales channel, principally for valuable oak and larch assortments; assessment of their causal market effects requires comparable transaction-level data.

Keywords: Czechia; development; oak; price; timber trade

Timber is traded through several marketing channels. In a face-to-face auction, harvested logs of different tree species are transported to a centralised auction yard, graded into quality assortments and

made available for pre-sale inspection by prospective buyers. The logs are subsequently allocated to the highest bidder. The present study examines this specific mechanism for marketing and valuing timber.

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The term 'auction' derives from the Latin *augēre*, meaning to increase or enlarge (Krishna 2002). Auctions may be forward, reverse or double, depending on the numbers and roles of sellers and buyers (Wilson 1979; Milgrom 2000), and may use open or sealed bidding procedures. Auctions of valuable timber assortments have a long history in the forestry and wood-based sector (Klemperer 2004).

Within the European Union framework, Directive 2011/83/EU on consumer rights distinguishes between standard auctions and public auctions. This study focuses exclusively on public auctions, which the Directive defines as a method of sale where goods or services are offered by a trader to consumers through a transparent, competitive bidding procedure conducted by an auctioneer. Under this framework, consumers attend or are afforded the possibility to attend the auction in person, and the successful bidder is legally bound to purchase the goods or services (European Parliament and European Council 2019).

Face-to-face timber auctions typically involve high-quality assortments, as documented in Poland (Paschalis-Jakubowicz et al. 2015; Zastocki et al. 2021), Austria (Pelzmann 2021), and Slovenia, where the auction held in Slovenj Gradec attracts buyers from across Central Europe (Pezdevšek Malovrh et al. 2017). Recent reports from German hardwood auctions likewise indicate rising prices for oak and ash, thereby providing a contemporary benchmark for the Central European auction market (Global Wood Markets Info 2026). Auction records can also elucidate the extent to which timber attributes influence market valuation. For example, an analysis of more than 38 000 Japanese log transactions identified an average certification premium of 1.4%, although the magnitude of this effect differed among tree species (Yamamoto et al. 2014). Such datasets further enable systematic assessment of the effects of certification and other institutional characteristics on log prices (Deniz 2023). Comparable face-to-face timber auctions are also conducted in the USA (e.g. Darrobers et al. 2024). Recent evidence from the Slovenj Gradec auction further illustrates the analytical potential of auction datasets: image-based deep-learning models classified tree species with an accuracy of up to 92.6%, whereas classification by market value achieved only 40.4–55.3%. This disparity suggests that timber value is determined by additional dimensional, qualitative, and market-related attrib-

utes that cannot be inferred reliably from images alone (Triplat et al. 2026). In France, auctions have served for centuries as the principal mechanism for the sale of public timber, allowing public forest managers to establish market values through competition among buyers. Although negotiated supply contracts have become increasingly prominent, auction prices continue to provide essential information for price discovery (Marty, Préget 2010).

Historically, timber in the Czech lands was sold either as standing trees or, particularly in the case of high-value assortments, via public auctions. During the Czechoslovak Republic (1919–1939), harvested and graded timber was commonly marketed through oral or sealed bidding under the supervision of forest administrations (Simanov 2022; Satora 2021, personal communication). Auctions disappeared under the regulated wartime and socialist economies, within which timber distribution and prices were centrally controlled (Bludovský 2005; Maléřová 2025). They re-emerged during the market transformation of Central Europe in the 1990s, although regular face-to-face auctions of high-value timber in the Czech Republic were not established until 2015.

The primary objective was to evaluate the development and market role of face-to-face auctions of valuable hardwood assortments in the Czech Republic. The study quantified annual recorded auction volumes, offered volumes by auction site and tree species, species and quality-class composition, seasonal distribution, starting and winning prices, and the relationship between realised auction prices and comparable Czech national oak prices.

To address these objectives, the study examines the following research questions (RQs):

- RQ₁: How did recorded auction volume at face-to-face auctions in the Czech Republic change between 2015 and 2025?
- RQ₂: Which tree species account for a significant share of the timber offered through face-to-face auctions?
- RQ₃: Do rare admixed tree species, such as wild service tree, achieve higher prices at face-to-face auctions than more commonly traded species?

MATERIAL AND METHODS

The dataset comprised auction-volume records (m³), prices achieved for individual assortments, tree species and auction seasons. Data from

auctions organised by the following companies were included in the analysis:

- (i) Deblice – lesy s.r.o.; registered office: Deblice 174, 289 01; tax identification number: CZ27103803; website: <https://woodauction.cz/>.
- (ii) Arcibiskupské lesy a statky Olomouc s.r.o.; registered office: Dvorského 5/17, 779 00 Olomouc – Svatý Kopeček; tax identification number: CZ699007032; website: <https://alsol.cz/>. Hereafter, the company is referred to as ALSOL.
- (iii) Jihozápadní dřevařská a.s.; registered office: Nádražní 351, 342 01 Sušice; tax identification number: CZ25236237; website: <https://jzdrev.cz/>.
- (iv) SVOL obchodní s.r.o.; registered office: K Silu 1980, 393 01 Pelhřimov; tax identification number: CZ17843677; website: <https://svolobchodni.cz/>.

The data are publicly available on the websites of the listed companies or from the companies upon request.

The auction dataset comprised 426 aggregated records from face-to-face auctions of valuable timber assortments conducted between 2015 and 2025; data for 2026 were incomplete. Each observation represented a unique combination of auction date, location, tree species and reported assortment or quality grade. Three distinct measures were used. Offered volume refers to quantities explicitly reported as offered for sale and was used for analyses by auction site, tree species and international comparison. Recorded auction volume refers to the total volume captured in the compiled auction records and was used for the aggregate temporal and seasonal analyses; it cannot be interpreted automatically as either offered or sold volume. Realised auction prices refer to winning prices for completed sales. The available records did not consistently indicate whether the entire offered or recorded volume was ultimately sold.

For temporal comparisons, observations were classified by calendar year, quarter (Q1, Q2, Q3 or Q4) and auction season *X/Y*, defined as Q4 of year *X* and Q1 of year *Y*. The incomplete 2025/2026 season was excluded from analyses requiring complete periods. Values coded as 'NA' (not available) indicate that the relevant value was unavailable in the source records. NA does not establish that timber was not offered or that no sale occurred, and it was therefore treated as missing and excluded from the corresponding calculations rather than replaced with zero. Because the data-

set covered only recorded auctions, it may not represent the entire Czech auction market; changes in the numbers of locations and records may therefore influence temporal comparisons.

The separate Czech Statistical Office dataset comprised 220 quarterly observations from 2015 to 2025 for quality classes with subclass I, II, III A/B, III C and III D (according to Wojnar 2007). For each year–quarter–grade combination, it reported the mean price excluding VAT (CZK·m⁻³) and, where available, the total volume sold and the volume sold by forest owners. Volume data were available only for 2015–2019, whereas price data covered 2015–2025. Comparisons with auction data were restricted to overlapping years and comparable quality grades.

Quarterly mean roadside prices for oak in the Czech market were obtained from the 'Ceny Les 1-04' statistical survey. The survey records realised domestic contract prices excluding value-added tax for timber sold by forest owners to the first domestic purchaser at the roadside; it excludes forest owners' own consumption and exports (Czech Statistical Office 2026a).

Recorded auction volumes, offered volumes and realised auction prices were summarised separately using totals, proportions, volume-weighted means, year-on-year changes and compound annual growth rates (CAGRs), as appropriate to the respective analysis. Aggregate temporal and seasonal analyses used recorded auction volume. Analyses of auction sites, species composition and the Czech–Slovenian comparison used offered volume. Realised auction prices were weighted by the corresponding recorded volume available for each price observation, thereby reducing the influence of records involving small quantities. Linear regression was used to estimate the mean change in recorded auction volume over time, and the coefficient of determination (R^2) quantified the proportion of variance explained by the model. Monotonic trends were assessed using the Mann–Kendall test and Spearman's rank correlation coefficient because these non-parametric methods do not assume normally distributed data and are less sensitive to extreme observations.

Differences between Q4 and Q1 within each auction season were assessed using the paired Wilcoxon signed-rank test, which is suitable for small samples of paired observations when normality cannot be assumed. Associations between auction

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prices and nationwide oak prices were examined using Pearson's correlation coefficient and linear regression, with quality grade as a control variable. Temporal trends, seasonal differences and price co-movement were evaluated at $\alpha = 0.05$, with results interpreted alongside effect sizes, sample sizes and data limitations. The a priori hypotheses were that recorded auction volume would increase over time, recorded auction volume would be greater in Q4 than in Q1, and realised auction prices for oak would be positively associated with comparable prices reported by the Czech Statistical Office. Because price differences may also reflect timber quality, dimensions, location, timing and log selection, statistical significance alone demonstrates neither economic importance nor a causal effect of the auction mechanism.

Prices in CZK were converted to EUR using the Czech National Bank's annual average exchange rate for the relevant calendar year (Czech National Bank 2026). For auction season X/Y , Q4 observations were converted using the rate for year X and Q1 observations using the rate for year Y before volume-weighted means were calculated. For real-price comparisons, nominal CZK prices were adjusted to 2025 price levels using cumulative inflation factors (Czech Statistical Office 2026b) and then converted at $24.693 \text{ CZK} \cdot \text{EUR}^{-1}$, yielding constant 2025 prices in $\text{EUR} \cdot \text{m}^{-3}$.

The volume of timber offered (m^3) at face-to-face auctions in the Czech Republic during the completed 2015/2016–2024/2025 auction seasons was compared with the volume offered at the Slovenj Gradec auction in Slovenia over the same period.

All analyses and graphical visualisations were produced using Microsoft Excel (Version 2024).

RESULTS

Development, spatial distribution and species composition of timber auctions

Face-to-face timber auctions have been held in the Czech Republic since 2015, when the first auction was organised by Deblice – lesy s.r.o. Jihozápadní dřevařská a.s. began organising auctions in Sušice in 2019, followed by Arcibiskupské lesy a statky Olomouc s.r.o. in 2021 and SVOL obchodní s.r.o. in 2024. During the 2024/2025 season, 11 auctions were held at nine locations: Dymokury (three auctions per season) and Bzová in the Central Bohemian Region; Křemže in the South Bohemian Region; Sušice in the Plzeň Region; Ostrava in the Moravian-Silesian Region; Moravská Huzová and Chropyně in the Olomouc Region; Holešov in the Zlín Region; and Břeclav in the South Moravian Region (Figure 1). ALSOL organised one auction per season in Kroměříž from 2019/2020 to 2022/2023; from the 2022/2023 season onwards, it organised

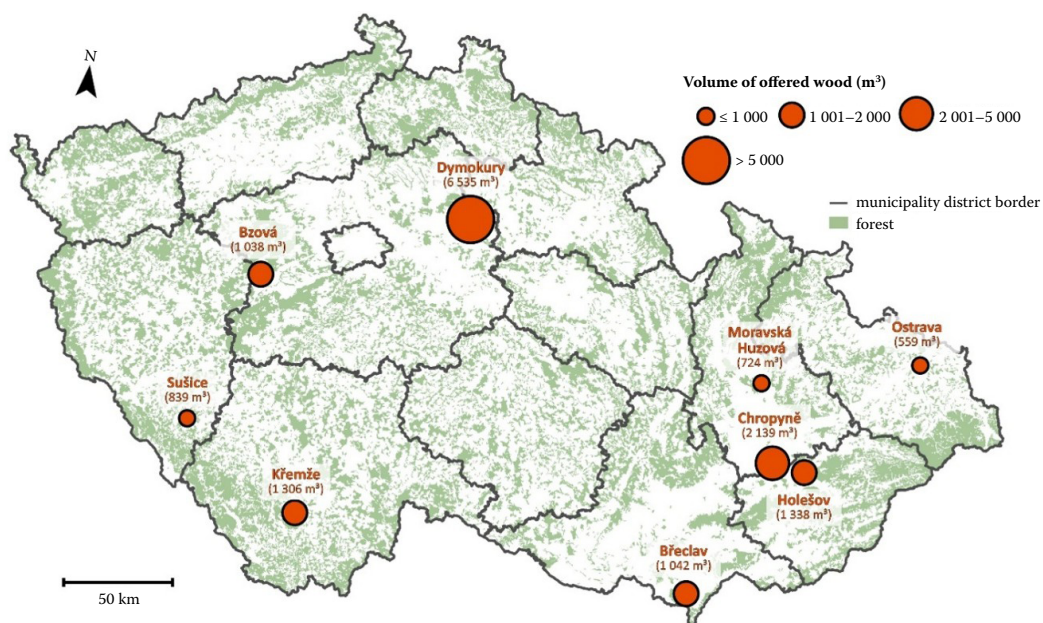


Figure 1. Locations of the nine face-to-face timber auction sites in the Czech Republic and the volume of timber offered at each site during the 2024/2025 auction season

two auctions, in Chropyně and Holešov (Figure 2). The annual auction season extends from November to March. In 2024/2025, the volume of timber offered at individual locations ranged from 559 m³ in Ostrava to 6 535 m³ in Dymokury (rounded), where three auctions were held during the season. The largest volume offered at a single auction was 2 230 m³ (rounded), recorded in Dymokury in March 2025. Auction sites were distributed relatively evenly across the Czech Republic, providing comparatively good accessibility for forest owners; the maximum distance from peripheral areas of the country to an auction site was approximately 130 km. The network was denser in Moravia, particularly in central Moravia, where sites were located at Moravská Huzová, Chropyně and Holešov.

The distribution among auction sites in 2024/2025 further illustrates this expansion: up to 1 000 m³ was offered at three sites, 1 000–2 000 m³ at three sites, 2 000–5 000 m³ at one site and more than 5 000 m³ at one site (Figure 1).

Figure 3 demonstrates a pronounced increase in recorded auction volume across the completed 2015/2016–2024/2025 auction seasons. The recorded market expanded substantially: recorded auction volume increased from 1 544.21 m³ in 2015/2016 to 14 681.95 m³ in 2024/2025, a 9.51-fold increase. Linear regression estimated an average increase of 1 426 m³ per season and explained 85.8% of the variation ($P < 0.001$); the monotonic

trend was also supported by Spearman's $\rho = 0.988$. The largest complete calendar-year recorded auction volume was observed in 2024 (12 542.33 m³), and the highest quarterly recorded auction volume was observed in Q1 2025 (12 542.15 m³).

Species composition, offered volumes and auction price trends. In the 2015/2016 auction season, timber from 14 identified tree species or species groups was offered, compared with 23 in the 2024/2025 season. Across the period 2015–2025, 34 tree species or tree species groups were represented (Table 1). However, some records were identified only to genus level; for example, pedunculate oak (*Quercus robur* L.) and sessile oak [*Q. petraea* (Matt.) Liebl.] were pooled as *Quercus* sp. Poplars were recorded as *Populus* sp. In 2015/2016, oak (*Quercus* sp.) was the dominant taxon, accounting for 86% of the total volume offered (1 440.10 m³). The remaining taxa were represented by substantially smaller volumes: a common ash (*Fraxinus excelsior* L.) (62 m³; 4%), European beech (*Fagus sylvatica* L.) (45.33 m³; 3%), (European) larch (*Larix decidua* Mill.) (29.05 m³; 2%) and red oak (*Quercus rubra* L.) (35.05 m³; 2%). Together, these five taxa accounted for approximately 96% of the total volume offered. In 2024/2025, oak (*Quercus* sp.) remained dominant, accounting for 59% of the total volume offered (9 030.86 m³). Larch was the second most abundant species (4 399.79 m³; 29%), whereas

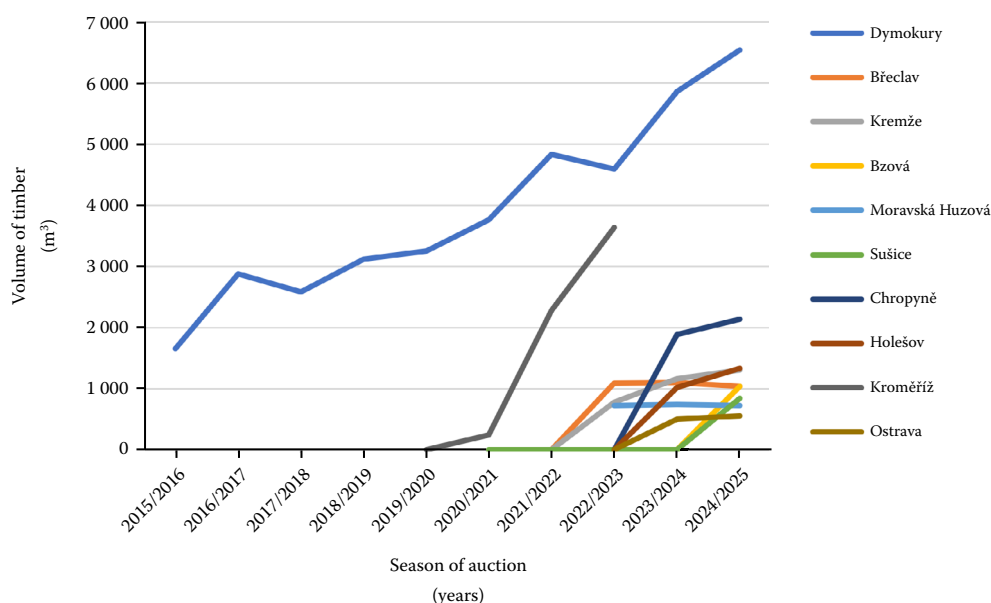


Figure 2. Volume of timber offered at individual auction sites, disaggregated by tree species (m³), for the auction seasons analysed

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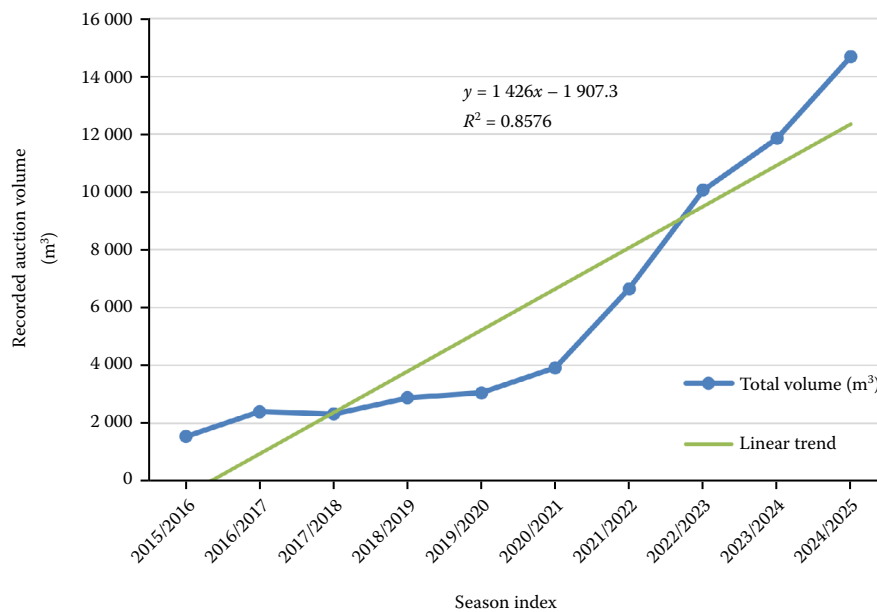


Figure 3. Increase in recorded auction volume (m³) across the completed 2015/2016–2024/2025 auction seasons

common ash accounted for 999.58 m³ (7%), Douglas-fir [*Pseudotsuga menziesii* (Mirb.) Franco] for 216.53 m³ (1%) and black walnut (*Juglans nigra* L.) for 134.59 m³ (1%). Together, these taxa represented approximately 96% of the total volume offered during the season. Across the entire study period, oak (*Quercus* sp.) accounted for 66.1% of the total volume offered, followed by European larch (*Larix decidua* Mill.; 17.4%) and common ash (*Fraxinus excelsior* L.; 8.6%). Black walnut (*Juglans nigra* L.), Douglas-fir [*Pseudotsuga menziesii* (Mirb.) Franco] and northern red oak (*Quercus rubra* L.) each accounted for approximately 1%. Oak dominated the supply throughout the study period (Figure 4), while European larch ranked second from 2022/2023 onwards. The offered volumes of both taxa increased over time, whereas common ash ranked third overall and remained comparatively stable from 2021/2022 onwards.

Rare tree species occurred only sporadically in the auction records. These included London plane [*Platanus × acerifolia* (Aiton) Willd.], wild service tree [*Sorbus torminalis* (L.) Crantz], Japanese pagoda tree [*Styphnolobium japonicum* (L.) Schott; syn. *Sophora japonica* L.] and sweet chestnut (*Castanea sativa* Mill.). Their low offered volumes provide no evidence that these species constituted an important component of the auction supply.

Oak remains the dominant tree species, but the species composition has changed markedly over

time. In the completed 2024/2025 season, oak accounted for 59% of the total volume offered, while larch reached 4 399.79 m³ and accounted for 29% of the total volume offered. European ash rose from 62.00 m³ in 2015/2016 to 999.58 m³ in 2024/2025, although its development was less consistent. Black walnut remained a small and irregular component, peaking at 301.25 m³ in 2022/2023.

Figure 5 presents inflation-adjusted realised auction prices for selected commercially important timber species. The 2017/2018 black walnut price is based only on the January 2018 lot because the December 2017 winning price was unavailable, although its volume was retained. Black walnut prices were unavailable for 2015/2016 and 2016/2017 and are shown as gaps rather than as zero values. For Figure 5, the inflation-adjusted realised auction price of black walnut for 2018/2019 was estimated by linear interpolation between the nearest available seasonal price observations.

Inflation-adjusted realised auction prices varied substantially among species and auction seasons, with no consistent long-term increase across the completed-season series. Oak prices remained comparatively stable, whereas ash prices were generally lower. Black walnut attained the highest observed prices, although its series was irregular and strongly influenced by a small number of lots. Maple and larch illustrate price developments for less frequently represented species. Black

<https://doi.org/10.17221/65/2026-JFS>Table 1. Offered volumes of timber in m³ for individual tree species in the auction seasons 2015/2016 to 2024/2025 and the total offered volume during the entire monitored period 2015–2025

Tree species	Offered timber volume (m ³) in the 2015/2016 season	Offered timber volume (m ³) in the 2024/2025 season	Average/maximum realised auction price (EUR·m ⁻³) in 2024/2025 (CNB weighted seasonal FX)	Total offered timber volume (m ³) in the period 2015–2025
<i>Abies alba</i>	NA	11.29	NA	48.28
<i>Acer campestre</i>	NA	NA	NA	4.16
<i>Acer pseudoplatanus</i>	3.00	86.99	148/551	425.49
<i>Acer</i> sp.	NA	12.67	64/131	146.86
<i>Aesculus hippocastanum</i>	NA	2.95	133/133	29.39
<i>Alnus glutinosa</i>	6.00	25.62	88/264	216.58
<i>Betula verrucosa</i>	1.00	NA	NA	7.26
<i>Carpinus betulus</i>	6.00	0.97	122/129	47.02
<i>Castanea sativa</i>	NA	1.44	NA	1.44
<i>Catalpa</i> sp.	NA	1.85	292/292	1.85
<i>Cerasus avium</i>	3.06	7.91	53/100	121.18
<i>Fagus sylvatica</i>	45.33	57.75	48/181	854.61
<i>Fraxinus excelsior</i>	62.00	999.58	221/555	6 728.44
<i>Juglans nigra</i>	NA	134.59	437/1 816	999.36
<i>Juglans regia</i>	NA	NA	NA	3.44
<i>Larix decidua</i>	29.05	4 399.79	314/947	13 621.78
<i>Malus</i> sp.	NA	NA	NA	1.09
<i>Picea abies</i>	NA	63.54	NA	285.45
<i>Pinus strobus</i>	NA	1.44	63/63	1.44
<i>Pinus sylvestris</i>	NA	11.33	NA	29.14
<i>Platanus acerifolia</i>	NA	NA	NA	5.82
<i>Populus</i> sp.	NA	NA	NA	12.41
<i>Prunus padus</i>	NA	NA	NA	0.64
<i>Pseudotsuga menziesii</i>	NA	216.53	165/265	976.37
<i>Quercus cerris</i>	NA	3.28	109/150	6.29
<i>Quercus rubra</i>	35.05	202.90	171/455	1 033.34
<i>Quercus</i> sp.	1 440.10	9 030.86	823/2 106	51 780.96
<i>Robinia pseudoacacia</i>	10.00	7.58	167/239	464.53
<i>Salix</i> sp.	1.00	NA	NA	2.35
<i>Sophora japonica</i>	NA	NA	NA	4.31
<i>Sorbus</i> sp.	NA	NA	NA	2.44
<i>Sorbus torminalis</i>	NA	NA	NA	2.38
<i>Tilia</i> sp.	7.00	9.56	86/190	131.16
<i>Ulmus</i> sp.	3.69	42.18	221/400	213.98
Other broadleaves	22.93	NA	NA	111.41

CNB – Czech National Bank; NA – not available (the relevant value was unavailable in the source records; NA does not indicate zero and does not by itself establish whether timber was or was not offered); the tree species are listed alphabetically; for species marked 'sp.', the exact species was not specified, and records were therefore retained at genus or species-group level; the timber volumes reported in Table 1 represent the quantities offered for sale at auction and not the quantities ultimately sold; by contrast, all price variables used in the subsequent analyses are based on realised auction prices for completed sales and, where indicated, are adjusted to constant 2025 prices

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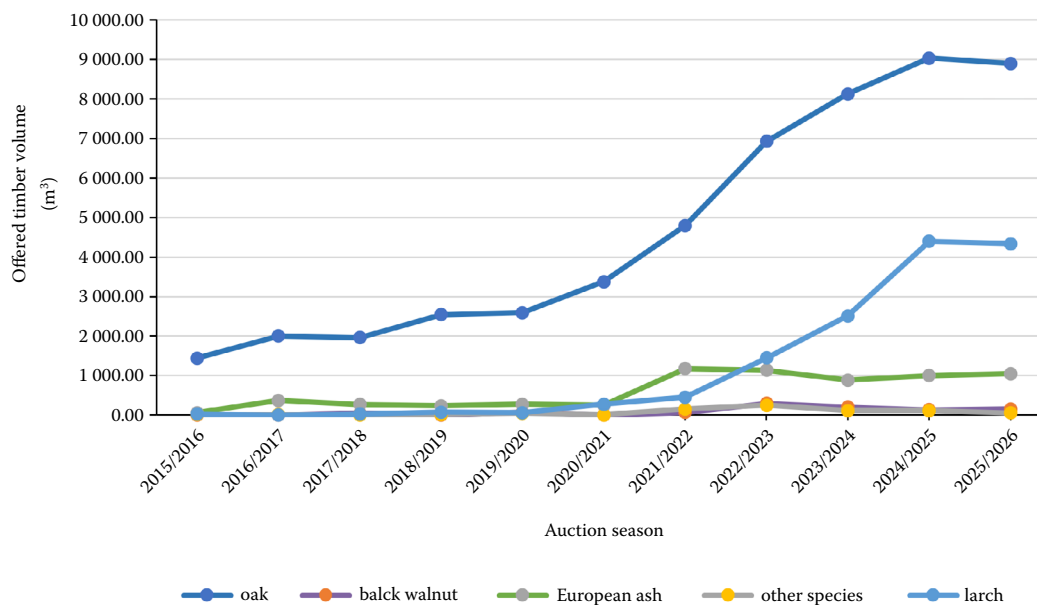


Figure 4. Offered timber volume by principal tree species and auction season (m^3)

walnut prices were unavailable for 2015/2016 and 2016/2017 and are likewise shown as gaps rather than as zero prices.

Table 2 summarises seasonal trends in total recorded auction volume, species-specific offered volumes and inflation-adjusted realised auction

prices for the principal timber species during the completed 2015/2016–2024/2025 auction seasons.

Total recorded auction volume increased significantly over the study period ($\tau = 0.956$; $P < 0.001$; CAGR 28.4%). Species-specific offered volumes also increased significantly for oak ($\tau = 0.956$;

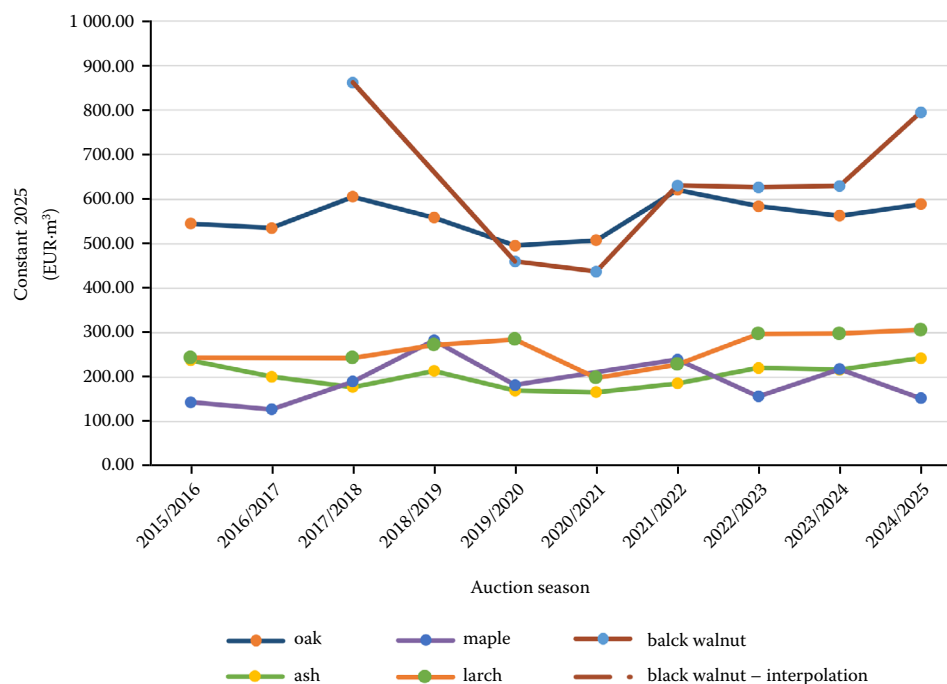


Figure 5. Inflation-adjusted realised auction prices for selected timber species across the completed 2015/2016–2024/2025 auction seasons, expressed in constant 2025 $\text{EUR} \cdot \text{m}^{-3}$

Table 2. Seasonal trends in total recorded auction volume, species-specific offered volumes and inflation-adjusted realised auction prices for the principal timber species during the completed 2015/2016–2024/2025 auction seasons

Series/metric	<i>n</i>	First value	Last value	CAGR (%)	Average annualised growth (%)	MK τ	Z	<i>P</i> -value	Sen slope/season	Assessment
Total recorded auction volume (m ³)	10	1 544.21	14 681.95	28.4	30.4	0.956	3.757	< 0.001	1 350.54	significant upward trend
Oak – offered volume (m ³)	10	1 440.10	9 030.86	22.6	23.8	0.956	3.757	< 0.001	843.42	significant upward trend
Larch – offered volume (m ³)	9	29.05	4 399.79	74.7	114.2	0.944	3.440	0.001	326.44	significant upward trend
Ash – offered volume (m ³)	10	62.00	999.58	36.2	92.4	0.467	1.789	0.074	103.84	upward trend not significant at 5%
Black walnut – offered volume (m ³)	7	49.94	134.59	15.2	353.6	0.429	1.202	0.230	21.33	not significant; irregular sample
Oak – inflation-adjusted realised auction price (constant 2025 EUR·m ⁻³)	10	544.93	588.70	0.9	1.3	0.244	0.894	0.371	4.52	no significant trend
Larch – inflation-adjusted realised auction price (constant 2025 EUR·m ⁻³)	9	243.73	306.35	2.6	4.3	0.500	1.772	0.076	6.86	positive indication; not significant
Ash – inflation-adjusted realised auction price (constant 2025 EUR·m ⁻³)	10	238.15	242.99	0.2	1.3	0.156	0.537	0.592	2.13	no significant trend
Black walnut – inflation-adjusted realised auction price (constant 2025 EUR·m ⁻³)	7	861.99	795.21	-1.1	6.4	0.143	0.300	0.764	42.32	no significant trend; volatile

n – number of available auction seasons; CAGR – compound annual growth rate between the first and last available values; average annualised growth – arithmetic mean of season-to-season percentage changes; MK τ – Mann–Kendall rank correlation coefficient; Z – standardised Mann–Kendall test statistic; *P*-value – probability used to assess statistical significance ($\alpha = 0.05$); Sen slope/season – Sen's robust estimate of the absolute change per auction season; inflation-adjusted realised auction price – winning auction price adjusted to the 2025 price level

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$P < 0.001$; $CAGR$ 22.6%) and larch ($\tau = 0.944$; $P < 0.001$; $CAGR$ 74.7%), whereas the increases in offered volumes for ash ($P = 0.074$) and black walnut ($P = 0.230$) were not significant at the 5% level. Oak's share of the total volume offered declined from 86% to 59%, while larch accounted for 29% in 2024/2025. No significant monotonic trends were detected in inflation-adjusted realised auction prices for any of the four species, although larch showed a weak positive indication ($P = 0.076$). Thus, expansion in total recorded auction volume was accompanied by higher offered volumes of the principal species rather than sustained growth in inflation-adjusted realised auction prices.

The Mann–Kendall test assesses a monotonic trend without assuming normality or linearity; two-sided significance is evaluated at $\alpha = 5\%$. Sen's slope is the median of all pairwise slopes and provides a robust typical change per season. $CAGR$ is the geometric rate between the first and last available positive observation. Average annualised growth is the arithmetic mean of annualised changes between consecutive available positive observations and may be strongly affected by a low base in volatile larch, ash and black walnut series. Species-volume tests use seasons with positive offered volumes only; prices are volume-weighted, restated in constant 2025 CZK and converted at the 2025 Czech National Bank rate of 24.693 CZK·EUR⁻¹. Total recorded auction volume and the offered volumes of oak and larch show significant upward trends, whereas no significant monotonic trend was identified in inflation-adjusted realised auction prices for oak, larch, European ash or black walnut at the 5% level.

Recorded auction volume was higher in Q1 in all ten completed auction seasons from 2015/2016 to 2024/2025. Aggregate recorded auction volume was 10 630.86 m³ in Q4 and 48 727.31 m³ in Q1, with Q4 accounting for only 17.9% of the combined recorded auction volume. The paired Wilcoxon signed-rank test confirmed that this difference was statistically significant ($P = 0.002$).

The volume-weighted realised auction price was higher in Q4 in eight of ten seasons, but the paired difference was not significant at 5% ($P = 0.084$). This suggests, but does not establish, higher prices at the beginning of the season. Event count, location, offered volume and assortment composition may explain the difference.

The largest recorded auction volume for a complete calendar year occurred in 2024 (12 542.33 m³),

while the highest quarterly recorded auction volume occurred in Q1 2025 (12 542.15 m³). The largest individual auction was organised by ALSOL in March 2023, with a recorded auction volume of 2 153.57 m³. Oak was the dominant taxon.

Across the completed auction seasons, statistically significant monotonic trends were identified in total recorded auction volume and in the species-specific offered volumes of oak and larch. The strongest evidence therefore supported growth in the recorded auction channel and a shift in offered-volume composition from oak towards larch. No significant monotonic trends were detected in the inflation-adjusted realised auction prices of oak, larch, ash or black walnut. Significant positive associations between offered volume and realised auction price were observed for oak and larch, but these associations do not establish causality.

The a priori expectation of greater recorded auction volume in Q4 was not supported; instead, the consistently higher recorded auction volume in Q1 indicates that most recorded auction activity occurred later in the auction season.

The tendency towards higher volume-weighted prices in Q4 was not conclusive and may reflect differences in auction frequency, location, offered volume and assortment composition rather than a systematic seasonal price effect.

Oak prices and relationship with the Czech market. Auction prices for oak were matched with Czech national mean prices for the same calendar year and comparable quality grade. Across 24 matched observations, nominal prices in CZK were strongly positively correlated (Pearson's $R = 0.820$; $P < 0.001$; $R^2 = 67.2\%$). The association remained strong after adjustment for mean differences among quality grades ($R = 0.815$) and was particularly pronounced for class II ($R = 0.928$; $P < 0.001$). The numbers of matched observations for subclasses III C and III D were insufficient for separate analysis.

After adjustment for inflation and conversion to constant 2025 EUR, the association strengthened slightly (Pearson's $R = 0.839$; $P < 0.001$; $R^2 = 70.4\%$). The fitted regression equation, $y = 348.8 + 0.534x$, indicates that an increase of 100 EUR·m⁻³ in the inflation-adjusted Czech national oak price was associated with an estimated increase of approximately 53 EUR·m⁻³ in the inflation-adjusted realised auction price. This relationship indicates price comovement and should not be interpreted as causal (Figure 6).

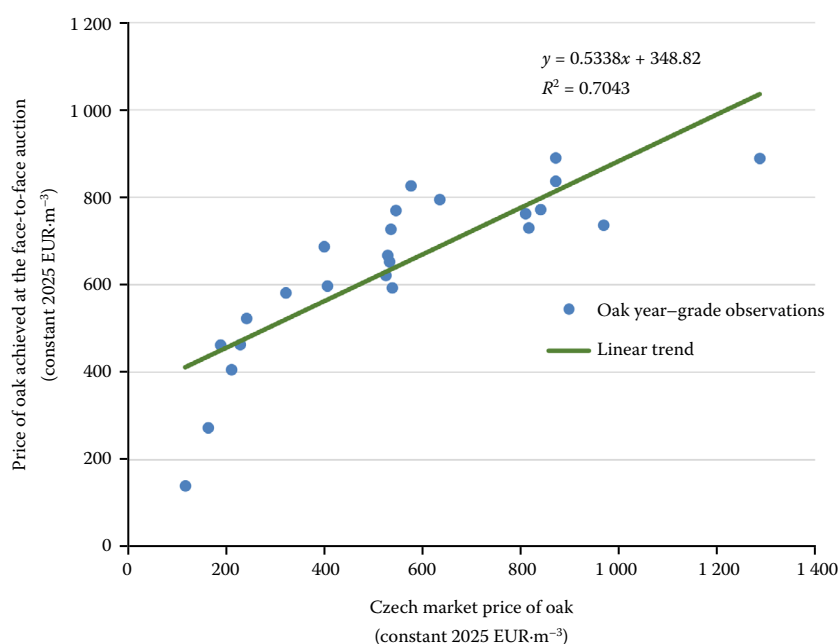


Figure 6. Relationship between inflation-adjusted realised auction prices for oak and comparable inflation-adjusted Czech national mean oak prices, expressed in constant 2025 EUR·m⁻³

Solid line – fitted linear regression

For 2015–2019, subclass III A/B made the largest contribution to the volume-weighted mean oak price. It accounted for 33.4% of the volume sold and 38.5% of total sales value, contributing approximately CZK 1 153·m⁻³ to the overall mean of CZK 2 994·m⁻³. Subclasses III C and III D followed, accounting for 27.3% and 20.1% of total sales value and contributing CZK 818·m⁻³ and CZK 602·m⁻³, respectively. Although classes I and II achieved higher unit prices, their low sales volumes limited their shares of total sales value to 5.1% and 8.9%, with contributions of only CZK 154·m⁻³ and CZK 267·m⁻³, respectively. The contribution of a class to the volume-weighted mean therefore reflects both its unit price and the volume sold.

Direct comparison of auction volumes with Czech sales volumes by quality class is possible only for 2015–2019. During this period, the reported volume of oak sold in the Czech Republic was 286 892.25 m³, whereas the recorded auction volume was 8 726.60 m³, equivalent to approximately 3.0%. This comparison indicates the relative size of the recorded auctions but should not be interpreted as an estimate of their market share after 2019. Total oak harvest is not an appropriate denominator because it includes fuelwood and lower-quality timber that is not comparable with the assortments sold at auction.

The oak data support two conclusions. First, auction prices and Czech national mean prices exhibit strong co-movement. Second, if the recorded auction transactions are included in the national statistics and the volume offered is assumed to equal the volume sold, higher-priced auction transactions mechanically raise the reported volume-weighted national mean. Under this conditional accounting decomposition, the largest estimated contribution occurred in 2018, amounting to CZK 567·m⁻³ (18.1%), followed by CZK 557·m⁻³ (17.1%) in 2019. These results do not demonstrate that the auction mechanism itself caused domestic market prices to increase. No suitable control group was available, and the effect of the sales method could not be separated from differences in timber quality, dimensions, location, timing, or seller and buyer selection.

For completeness, Figure 7 compares the Czech national mean oak price with the modelled auction contribution for 2015–2019, the period for which these data were reported by the Czech Statistical Office.

In Figure 7, the blue line represents the reported Czech national mean oak price and the orange line the modelled accounting contribution of recorded auctions on the secondary axis. Assuming that auction transactions were included in the na-

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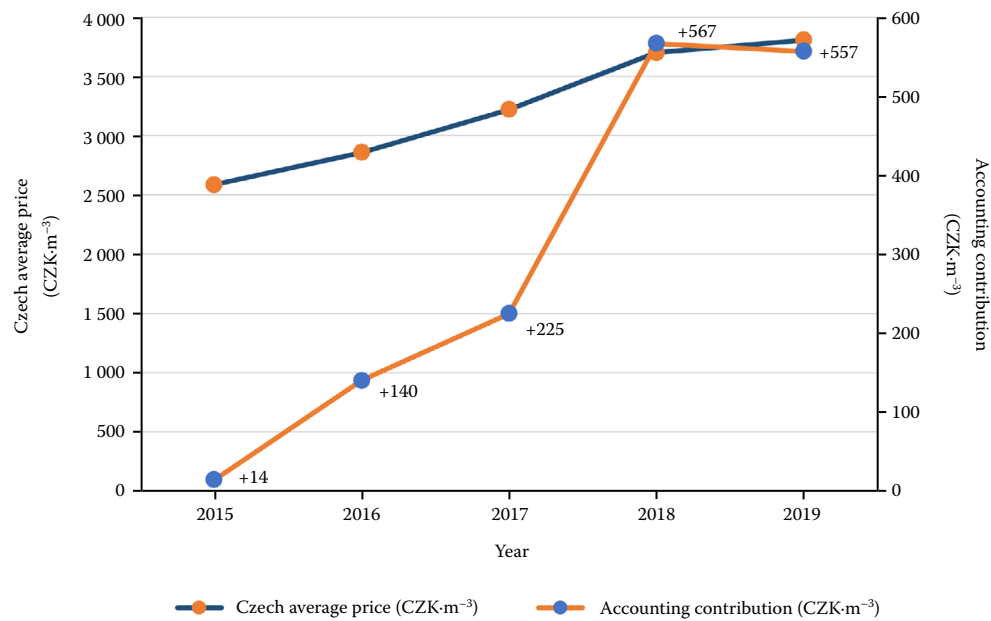


Figure 7. A comparison of the Czech national mean oak price with the modelled auction contribution for 2015–2019

tional statistics and that offered volume equalled sold volume, the estimated contribution increased from CZK 14·m⁻³ in 2015 to CZK 567·m⁻³ in 2018 and CZK 557·m⁻³ in 2019. This conditional decomposition does not demonstrate that auctions caused higher market prices.

A comparison with the Slovenj Gradec auction in Slovenia (Tiama 2026), where auctions have been

held since 2006 and are used by Slovenian and Austrian forest owners as well as buyers from across Europe, showed a broadly similar trend in the volume of timber offered in Slovenia and the Czech Republic over the completed 2015/2016–2024/2025 auction seasons (Figure 8). Slovenia offered a wider spectrum of tree species, comprising 21 tree species in the 2024/2025 season, including European

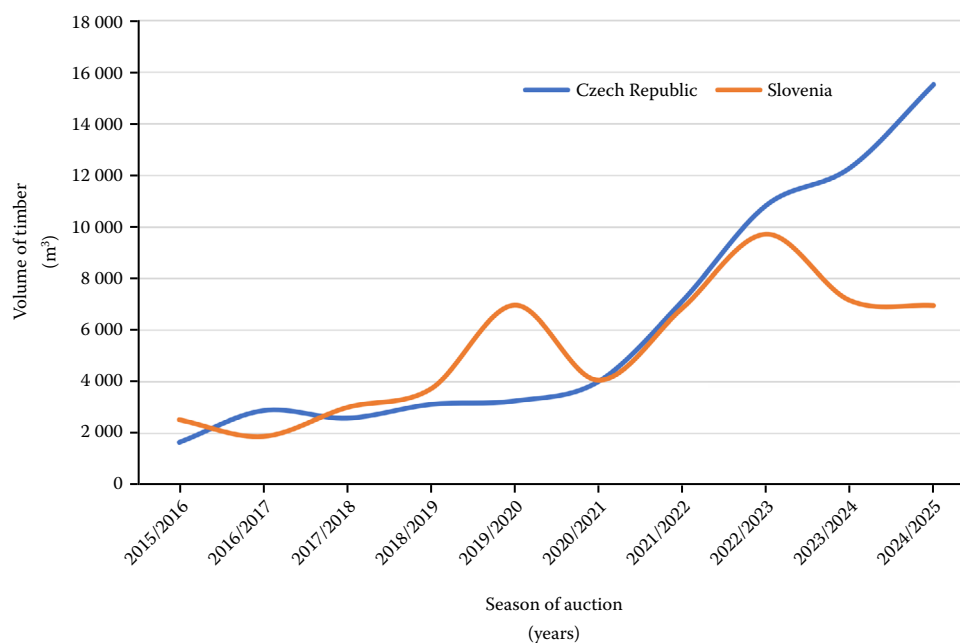


Figure 8. Comparison of offered timber volume at auctions in the Czech Republic and Slovenia across the completed 2015/2016–2024/2025 auction seasons

plum (*Prunus domestica* L.), common pear (*Pyrus communis* L.) and common yew (*Taxus baccata* L.); oak nevertheless remained a principal focus. Slovenian records distinguished pedunculate oak (*Quercus robur*) from sessile oak (*Q. petraea*).

Coverage changed over time and later years include more locations. Some species and grades have few observations, and part of the oak volume lacks a grade. Correlation, regression and the accounting removal of auction transactions do not establish causality. A causal estimate would require transaction-level data for comparable auction and conventional sales, controls for quality, dimensions, location and timing, and a suitable control group or quasi-experimental change in the selling method.

DISCUSSION

Modern auctions of valuable timber assortments became established in Germany, Austria and Poland between the mid-1990s and early 2000s, whereas regular Czech face-to-face auctions began in 2015 (Krüger, Hagemann 2003; Pelzmann 2021; Zastocki et al. 2021). The subsequent increase in the number of organisers and recorded auction volumes indicates expansion of this sales channel, although changes in site coverage over time limit direct temporal comparisons. The Czech organisational model, involving both forest owners and private marketing companies, also differs from systems in which public forestry organisations play a more direct role (Zastocki et al. 2021).

In 2024/2025, approximately 15 000 m³ was offered across 11 Czech auctions. Distributing this volume among several sites may reduce transport distances and increase harvesting flexibility, but smaller individual events may be less attractive to distant buyers. Auction frequency, lot configuration and bidder participation can affect winning prices and seller revenue (Farnia et al. 2013), while spatial bundling may reduce harvesting, transport and equipment-relocation costs (Rönnqvist et al. 2018). Auction prices can provide wider market signals only when offered volumes and bidder participation are sufficiently representative (Athey et al. 2002); these conditions were not tested directly here.

The auctioned species composition differed markedly from that of Czech forests. Oak accounted for 66.1% of the total volume offered despite

representing only approximately 8% of Czech forests, whereas Norway spruce and Scots pine were marginal in the auction records (Ministry of Agriculture of the Czech Republic 2025). This contrast indicates specialisation in selected valuable assortments rather than representation of the national forest resource. The limited supply of rare species does not imply low silvicultural or ecological value, because species selection involves trade-offs between economic return and biodiversity objectives (Holuša et al. 2020; Gang et al. 2024). However, the present data do not support conclusions about price premiums for rare species.

Oak remained the dominant taxon throughout the study period, although its share declined as offered volumes of larch increased. Comparable auctions in Poland and Austria also report the commercial importance of high-quality oak assortments (Pelzmann 2021; Zastocki et al. 2021). In the Czech series, however, inflation-adjusted realised auction prices showed substantial interannual variation and no significant monotonic trend. Price differences should therefore be interpreted in relation to timber quality, dimensions, seasonality and wider market conditions rather than attributed to a single factor. Evidence from certified log sales similarly shows that observed premiums may reflect several concurrent supply, demand and institutional influences (Deniz 2023), while differences in buyers' assessment of processing potential may add further variation.

Auction prices for oak were strongly associated with comparable Czech national mean prices, including after adjustment for inflation and quality class. This co-movement is consistent with evidence that more open timber sales channels may respond to common market trends (Wysocki et al. 2025), but it does not demonstrate that auctions caused changes in national prices. The direct volume comparison for 2015–2019 also indicates that recorded auctions represented only a limited share of comparable Czech oak sales. To illustrate the possible economic implications for sellers, a modelled comparison was undertaken for 100 m³ of class II oak in 2024/2025. Using a roadside price of CZK 13 584·m⁻³, a gross auction price of CZK 19 775·m⁻³ and assumed incremental costs of CZK 1 743·m⁻³, the model yielded estimated net auction proceeds of CZK 18 032·m⁻³ and a net benefit of CZK 4 448·m⁻³, or 32.7%. The assumed costs comprised transport at CZK 800·m⁻³, sorting and handling at CZK 250·m⁻³,

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preparation at CZK 100·m⁻³ and a commission equal to 3% of the gross auction price. These inputs were illustrative rather than empirically verified, and the estimated premium may also reflect differences in timber quality, dimensions and buyer composition. The calculation should therefore be interpreted as a scenario illustrating potential economic implications, not as evidence of a causal auction effect.

The suitability of auctions also depends on transaction characteristics. Auctions are more likely to be used when timber can be clearly specified, sawtimber quality is high and sufficient bidder competition exists, whereas negotiated sales may be preferable for more complex transactions (Rucker et al. 2025). Joint marketing through forest owner associations may help small owners access specialised sales channels (Aurenhammer 2017), and coordinated marketing has been associated with improved prices and net returns in other regional contexts (Seeland et al. 2011). Such organisations can also provide logistical and advisory support, although their effectiveness depends on alignment with members' differing objectives and levels of engagement (Kajanus et al. 2019; Thorning 2024).

The findings should be interpreted in light of changing auction-site coverage, incomplete information on whether offered volumes equalled sold volumes, sparse observations for some species and classes, and the absence of a suitable control group. Transaction-level comparisons with conventional sales would be required to separate the effect of the sales mechanism from timber quality, dimensions, location and timing. Future participation may also depend on communication tailored to heterogeneous forest-owner groups, as levels of engagement and willingness to mobilise timber vary substantially among private owners (Kumer, Štrumbelj 2017; Triplat et al. 2023). Overall, the results support growth of the recorded auction channel and its specialisation in valuable oak and larch assortments, but not strong causal claims about wider market, silvicultural or social effects.

CONCLUSION

The recorded Czech face-to-face auction channel for valuable timber assortments expanded substantially over the study period. As shown in Figure 3, recorded auction volume increased from 1 544.21 m³ in 2015/2016 to 14 681.95 m³

in 2024/2025. The fitted trend indicated an average increase of 1 426 m³ per season and explained 85.8% of the observed variation. Oak remained the dominant taxon in terms of offered volume, while the increasing offered volume of larch altered the species composition documented in Table 1 and the species-specific rows of Table 2.

A pronounced seasonal pattern was identified. Across the ten completed auction seasons, Q1 accounted for 82.1% of the combined Q4–Q1 recorded auction volume, and the difference between quarters was statistically significant. By contrast, the volume-weighted realised auction price was higher in Q4 in eight seasons, but this tendency was not statistically significant. Seasonal differences in event frequency, location, offered volume and assortment composition may therefore be more important than a systematic quarterly price effect.

The expansion in total recorded auction volume was accompanied by higher offered volumes of the principal species rather than sustained growth in inflation-adjusted realised auction prices. Table 2 shows significant upward trends in total recorded auction volume and in the offered volumes of oak and larch, whereas no statistically significant monotonic trend was detected in inflation-adjusted realised auction prices for oak, larch, ash or black walnut. Figure 5 further demonstrates substantial variation among species and seasons, particularly for black walnut, for which the available series was sparse and strongly influenced by a small number of lots.

Auction prices for oak moved closely with comparable Czech national mean prices. Figure 6 shows that the relationship remained strong after adjustment for inflation and conversion to constant 2025 euros (Pearson's $R = 0.839$; $P < 0.001$; $R^2 = 70.4\%$). Quality composition also influenced the national volume-weighted mean: during 2015–2019, subclass III A/B made the largest contribution because it combined a substantial sales volume with a comparatively high unit price. The association between auction and national prices indicates co-movement, but does not establish that auctions caused changes in the wider market.

Interpretation is limited by changes in auction-site coverage, uncertainty as to whether offered volumes equalled sold volumes, sparse observations for some species and quality classes, and the absence of a suitable control group. Figures 6 and 7 therefore show association and a conditional ac-

counting contribution rather than causality. Nevertheless, the evidence indicates sustained growth of the recorded auction channel, continued dominance of oak and increasing importance of larch.

In answer to RQ_1 , recorded auction activity increased markedly across the completed seasons. This expansion was reflected in the growth of recorded auction volume and was accompanied by increasing offered volumes of the principal species, particularly oak and larch, rather than sustained growth in inflation-adjusted realised auction prices. The concentration of recorded auction volume in Q1 also contradicted the initial expectation of higher volumes in Q4.

In answer to RQ_2 , the auctions specialised in a narrow group of commercially important species dominated by oak. Across the entire study period, oak accounted for 66.1% of the total volume offered, followed by European larch (17.4%) and European ash (8.6%). Oak remained dominant throughout the study period, although the increasing share of larch in offered volume altered the species composition over time.

In answer to RQ_3 , rare admixed species occurred only sporadically and in very small volumes. The available observations are therefore insufficient to demonstrate that these species achieved systematic price premiums over commonly traded species. Their limited representation in the auction records should not be interpreted as evidence of low silvicultural or ecological value.

Overall, Czech face-to-face auctions constitute a growing but specialised sales channel whose principal importance lies in marketing high-value oak and larch assortments. Their broader market effects cannot be established without comparable transaction-level data and an appropriate control group.

Data availability statement: The data used in this study are available from the individual economic entities analysed. The data itself was not generated by the study.

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