Model for Changes in Fees for Audits of Financial Statements during the Pandemic Period

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Summary

Purpose: The aim for undertaking of the title issue is the intention to examine – for audit firms outside the largest audit firms (TOP11 or TOP12 for 2022) – the developments in fees for the audit of the financial statements of entities other than public interest entities during the pandemic period. An additional objective was to approach answering the question: whether the pandemic, forcing a shift to remote auditing of these statements, has changed audit firms' behaviour in the practice of selecting clients from further distances.

Methodology/research approach: It was possible to fulfil the objective assumed by presenting a proposal for the author's model (function) of salary changes, which takes into account the specific nature of the pandemic period. When constructing and using this model, data resulting from the Database of Annual Reports of Audit Firms for 2020–2022, created at the Polish Agency for Audit Oversight at its inception in 2020, were used. The analysis of the data available in this database, at the same time those that coincided with the period of the Covid-19 pandemic and were appropriately extended for the needs of the analysis, consisted in diagnosing the peculiarities of the studied sample and establishing the characteristics of the explaining variables, as a result of which a proposal was formulated for modelling the issue undertaken.

Results: The article confirms the existence of a dependence of the remuneration for statutory audit services on the type of the financial statement audited, the 'high' or 'low' season of rendering these services, and the distance between the audit firm and the entity audited. In addition, it focuses on a deeper understanding of the sign of the coefficient appearing in the model with the variable indicating the season. The

study has also indicated a trend of undertaking financial statement audit assignments from entities relatively more distant from the audit firm.

Research limitations/implications: The primary limitation is the identification of the actual location of the audit firm' registered office at which the services were rendered. For this reason, the largest audit firms with multiple branches have been eliminated from the database. Another limitation (however, affecting the results only insignificantly) is the method used for measuring the distance. The distance was calculated as the distance in a straight line between the audited entity's registered office and the audit firm's registered office. Manual recalculation of a few examples indicates that the distance measurement error may be at a level of no more than several kilometres.

Originality/value: The author notes the lack of published research in the area assumed and identifies a research gap. The article partly complements it by contributing to the understanding of the functioning of the process of measuring revenue in audit firms earned from the provision of audit services provided to entities other than public interest entities. The conclusions presented can provide an incentive for further research and development of the model for post-pandemic periods, taking into account the distinctive features specific to that period.

Keywords: auditor, statutory auditor, audit, audit fees, pandemic

Introduction

The pandemic caused by the SARS-CoV 2 coronavirus (known as the COVID-19 pandemic) has become a global catalyst that triggered particularly strong increases in the volume of work performed using electronic means of communication (Mierzejewska, Dziurski, 2021). In the first lock-down periods, in particular, during weeks or even months, employees (including auditors and audit teams) had to communicate and perform work remotely.

Traditionally, financial statements are audited at a company's location. In the face of health safety restrictions, remote auditing has become an important alternative, and sometimes a necessity. However, this means of communication had already been used by larger audit firms on a regular basis, but it was not so straightforward for small practices because of technical and intellectual resources they had.

Based on the study by Sharma et al. (Sharma, 2022), India was eager to incorporate new technologies into the auditing practices adopted. On the other hand, in their 2023 study (Jarva, Zeitler, 2023), Jarva and Zeitler concluded that as far as internal auditing is concerned, the pandemic had no effect on technological changes in the entities covered by the empirical study. This may indicate that audit firms use technology for the purposes of auditing financial statements in a way different from that in which they use technology for the purposes of internal auditing. According to the study conducted by Haddad et al. (Haddad H., Al-Bawab A., Ahmad M., 2023), the pandemic has prompted companies to accelerate their digital transformation processes, including auditing. In the article titled *The Impact of Covid-19 Pandemic on the Auditing Profession*, it is highlighted that the economy, including the profession of auditor, has been significantly affected by the Covid-19 pandemic. Revenues of audit firms have declined and the productivity and the number of customer visits have dropped. The results of the study indicate that effective strategies for mitigating an adverse impact of crises on the profession of an auditor and maintaining its financial stability and performance need to be further researched and explored.

The review of literature shows that it is likely that during the pandemic medium and small audit firms should commence to adapt and to adjust to the changing conditions of remote work. It is therefore interesting to verify whether this happened indeed during the pandemic.

The Polish Agency for Audit Oversight started operating at the beginning of 2020. This fact also coincided with the beginning of the COVID-19 pandemic. The Agency thus began to collect data on the services provided by all Polish audit firms and by statutory auditors acting on their behalf in the period concerned. During the three-year pandemic period (2020–2022), a unique database was created with information on audits conducted by audit firms. The detailed scope of information kept in the database is indicated in the Regulation of the Minister of Finance, Funds and Regional Policy of 18 January 2021 on the annual reporting of audit firms (Regulation, 2021) and includes, among other things, the indication of the type of services (statutory or voluntary auditing), the provision date of the services, the indication of the beginning and end of the financial year for which the audited financial statements are prepared as well as information about the entity to which the services were provided and the price for the audit conducted.

Owing to this database, a detailed analysis of the number of services rendered in each pandemic year was carried out and presented on the Agency's website.

And, thus:

- The audits conducted in 2020 were as follows: 28,697 audits of financial statements and 1,644 audits of consolidated financial statements (Baklarz, Kreis, 2021);

- The audits conducted in 2021 were as follows: 28,012 statutory audits of financial statements and 1,617 audits of consolidated financial statements (Baklarz, Kreis, 2022);
- The audits conducted in 2022 were as follows: 29,085 statutory audits of financial statements and 1,650 audits of consolidated financial statements (Baklarz, Kreis, 2023).

In this way, approximately 90,000 records of audits conducted by audit firms entered in the list kept by the Polish Agency for Audit Oversight in Poland were collected.

Due to such an extensive database and to a lack of analysis of factors other than those specified in Article 80 para. 2 of the Act on Statutory Auditors, according to which '*audit fees received by audit firms, statutory auditors and subcontractors acting on their behalf and for their benefit may not depend on any condition, including the results of the audit conducted*' (Law, 2017), the author hereof decided to carry out an in-depth analysis of changes in audit fees paid to audit firms during the pandemic period and their dependence on the distance between the auditor's registered office and that of the entity audited. Taking into account the duration of the pandemic period, a hypothesis was formulated that audit firms were more likely to conduct audits of the entities located farther away from their registered offices, which was made possible owing to an increased number of procedures carried out remotely.

As a result of the pandemic, the provisions of the Accounting Act, according to which financial statements are to be prepared within a 3-month period of the balance sheet date and then audited and approved in the following three months, were amended to such a way that such periods were extended (six months for the preparation of financial statements and another three months for their audit and approval). The author also analysed the impact of the aforementioned amendments on audit fees.

The analyses carried out included, in particular, the distance between the registered office of the entity analysed and the registered office of the audit firm.

However, the largest audit firms (TOP11 for 2020–2021[1] and TOP12

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[1]   TOP11 – audit firms from groups A and B of the list of audit firms conducting statutory audits in public interest entities in 2020–2021 (the list of firms in this scope has not changed); these are firms that provide more than 1% of services (in relation to the fees of all audit firms auditing public interest entities). The TOP11 group included the following companies: KPMG Audyt spółka z ograniczoną odpowiedzialnością spółka komandytowa, PricewaterhouseCoopers Polska spółka z ograniczoną odpowiedzialnością, Audyt spółka komandytowa, BDO spółka z ograniczoną odpowiedzialnością spółka komandytowa, Deloitte Audyt spółka z ograniczoną odpowiedzialnością spółka komandytowa, Ernst & Young Audyt Polska spółka z ograniczoną odpowiedzialnością spółka komandytowa, Grant Thornton Polska spółka z ograniczoną odpowiedzialnością spółka komandytowa, Mazars Audyt

for 2022²), were excluded from the analyses, as these firms often have branches across the country, and the annual reporting of audit firms does not specify which branch is responsible for auditing particular financial statements. In addition, the scope of the analyses carried out did not cover audits of financial statements of public interest entities, which were conducted in accordance with extended audit procedures resulting, among others, from EU requirements (Regulation, 2014), extended provisions resulting from auditing standards, or the applicable code of ethics for statutory auditors.

Finally, the analyses carried out concerned 21,916 audits conducted in 2020, 22,384 audits conducted in 2021 and 21,926 audits conducted in 2022, for a total of 66,226 audits.

1. Specific nature of the sample analysed – seasonality of audit services

When analysing audit fees in conjunction with the aforementioned factors (the distance, the seasonality and the type of the financial statements audited), it is worth noting that audit services are of a seasonal nature and that it is necessary to clarify the understanding of the distance between the entity audited and the audit firm.

The analysis of data concerning the seasonality of services rendered by audit firms demonstrates that if the services were rendered regularly throughout the year, the audits conducted monthly would constitute 8.33% of all the audits conducted throughout the year. However, Figure 1 illustrates a strong seasonal volatility of the monthly number of audits. It should be pointed out that in the different years of the period analysed, the number of financial audits conducted in particularly critical months (March, June and September), slightly changed its distribution. At this point it may be recalled that in 2020–2022 (i.e., the pandemic period) the time limit for preparing financial statements has been extended to the end of June (i.e., up to 6 months instead of the legally required time limit of 3 months after the end of the financial year). As demonstrated, in 2020, in spite of difficult conditions, companies sought to maintain the original time limit and only some of the audits were shifted to September. This may have been due to

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spółka z ograniczoną odpowiedzialnością, PKF Consult spółka z ograniczoną odpowiedzialnością spółka komandytowa, UHY ECA Audyt spółka z ograniczoną odpowiedzialnością spółka komandytowa, Związek Rewizyjny Banków Spółdzielczych im. Franciszka Stefczyka in Warsaw, Związek Rewizyjny Banków Spółdzielczych w Poznań.

2 TOP12 – audit firms from groups A and B of the list of audit firms conducting statutory audits in public interest entities in 2022. As far as TOP11 is concerned, the group was increased by POL-TAX 2 Limited Liability Company.

the obvious will of both parties to comply with the contractual terms. According to Article 66 para. 5 of the Accounting Law (Accounting Law, 1994), contracts for the provision of audit services shall be concluded in such a way as to allow for statutory auditors to participate in the stocktaking. In practice, this means that it should be done even before the end of the financial year audited. Taking into account that a financial year is in practice predominantly the calendar year, it can be assumed that contracts for the provision of audit services for 2019, which are de facto provided in 2020, should already be concluded in 2019, the year preceding the pandemic. In 2021 and 2022, however, the organisation of work changed and the provision of audit services shifted significantly from March to September. This was particularly true in 2022, when the proportion between the number of audits conducted in March and September reversed.
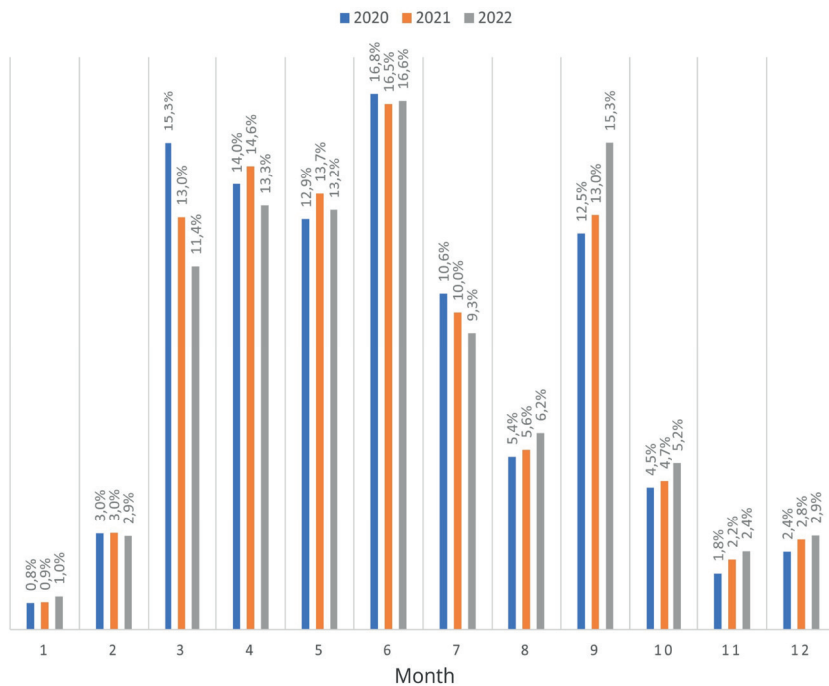

Figure 1. Share of the number of audit services provided on a monthly basis in the total number of audit services rendered in the years 2020–2022

Source: Own study based on the data available from: PANA – Database of Annual Reports of Audit Firms, 2020–2022.

The analysis of the monthly number of audits conducted (Figure 1) shows that the pandemic period in the audit industry had its 'high season' (a high intensity of audits), which included March, April, May, June, July and September, and its 'low season' (a low intensity of audits), which included August and the autumn and winter months. Taking the foregoing in consideration, a logical variable of high season was added to the model applied in order to identify services that are provided in the months of increased workload.

2. Specific nature of the sample analysed – a distance between the entity audited and the audit firm

In order to analyse an impact of the distance between the audited entity and the audit firm on fees, it was necessary to add contact details to information derived from the annual reports of audit firms available in the PANA database. Contact details of the audit firms were derived from the list of audit firms. Contact details of the audited entities were obtained from the annual GUS database, based on their tax identification numbers. Based on these contact details, the geographic coordinates of each entity were determined using the API (*Application Programming Interface*) provided by Google. The distance in kilometres between the audited entity and the audit firm was calculated based on the arc distance formula, using the formula presented as Equation 1 (assuming that the Earth is a perfect sphere).

Equation 1

$$Distance = arccos(cos(latitude1) \times cos\,(latitude2) \times cos\,(longitude1\text{-}longitude2) + sin\,(latitude1) \times sin\,(latitude2)\,) \times 10000 \div arccos(0)$$

where:

latitude1, latitude2: latitude of the 1st and 2nd point respectively, longitude1, longitude2: longitude of the 1st and 2nd point respectively.

The calculation resulted in the distances being set in kilometres as straight-line distances, i.e., without taking into account the actual shape of a route between the audit firm and the audited entity. Figure 2. illustrates the number of audits in relation to the distance (up to 310 km) between the audit firm and the audited entity, and Table 1 presents information concerning distances between the audited entity and the audit firm in each year of the audited period.

As can be seen, the median distance between the audit firm and the audited entity has been gradually increasing (a ten-percent increase between 2020 and 2022). The average distance between entities has also been increasing (here: 2.5% in the period concerned). The area of Poland has a limited spread, and this is why the increase

in the average distance has been naturally limited and grows more slowly than the median. Nevertheless, changes in the median have not been significant, and may lead one to conclude that audit firms acted in various ways during the pandemic. A gradual increase in the median distance in subsequent years may result from an increase in the number of audit procedures carried out remotely.
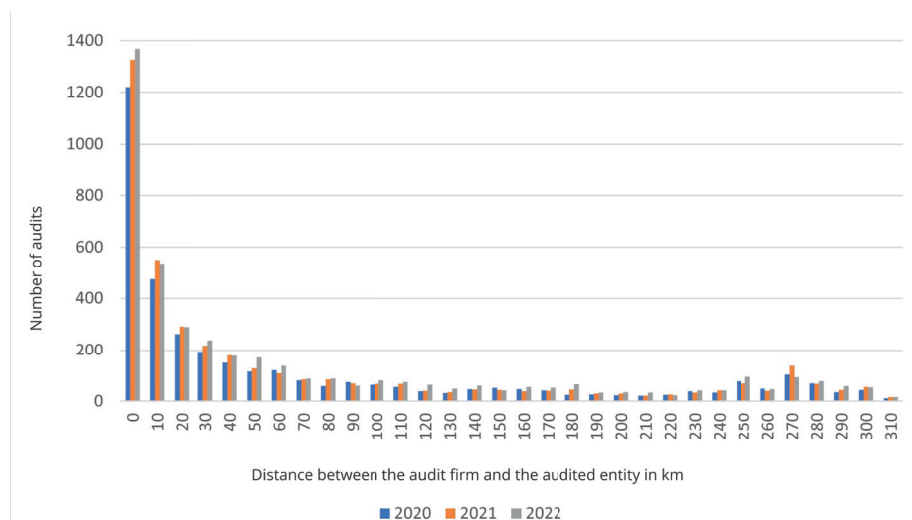

Figure 2. Number of the audits conducted as a function of the distance between the audit firm and the audited entity in 2020–2022

Source: Own study based on the data available from: PANA – Database of Annual Reports of Audit Firms, 2020–2022

Table 1. Basic information on the spread of data about the distance between the audit firm and the audited entity in 2020–2022

Descriptive characteristics of the distance	Year		
	2020	2021	2022
Average distance (km)	82.138	82.824	84.221
Median distance (km)	29.094	30.206	32.235
Minimum distance (km)	0.000	0.000	0.000
Maximum distance (km)	665.010	665.010	665.010

Source: Own study based on the data available from: PANA – Database of Annual Reports of Audit Firms, 2020–2022.

3. Specific nature of the sample analysed – types of financial statements audited each year

Audit fees may be affected by the types of financial statements audited. This is due to the fact that the tasks performed during the audit of consolidated financial statements differ slightly (National Auditing Standard 600, 2019) from those performed when auditing separate financial statements. Taking this into consideration, it is assumed that the type of financial statements to be audited affects the pricing of the audit services rendered.

Table 2 presents the number of audits conducted during the period analysed, but takes into account the dissimilarity of the standards applied: the logical variable for audits of consolidated financial statements is 1 and the logical variable for audits of separate financial statements is 0.

Table 2. The populations analysed by type of financial statements
in 2020–2022

Type of the financial statements audited	Year		
	2020	2021	2022
Separate financial statements	21.068	21.285	21.090
Consolidated financial statements	848	1.099	836
Total	21.916	22.384	21.926

Source: Own study based on the data available from: PANA – Database of Annual Reports
of Audit Firms, 2020–2022

4. Model proposed for assessing the impact of selected factors on audit fees in the pandemic period

When developing a dedicated model, it was assumed that an audit fee (revenue of the audit firm, Audit Revenue) was a linear function specific to a year in which audit services were rendered and dependent on a distance between the audited entity and the audit firm (Distance) and on the type of the financial statements audited (SSF, which was 1 for consolidated financial statements and 0 for separate financial statements), and on whether the audit was conducted in high season (High Season, which was 1 for March, April, May, June, July and September, and 0 for the remaining months). This interrelation is described by Equation 2.

Equation 2.

Audit Revenue

$= Const + a \times (Year\text{-}2019) + b \times High\ Season + c \times Distance + d \times SSF$

First, the model is verified for the entire database, including all the three years. Next, the model is verified for each year separately in order to determine whether the parameters for each year are within an acceptable error of the multi-year model parameters. This helps identify whether any other additional, unknown factors become apparent which would have an impact on changes in audit fees. This analytical procedure allows for a model picture of changes in audit fees to be obtained for the years of the outbreak, duration and extinction of the pandemic and for the full pandemic period.

4.1. Determination of parameters for the audit fee volatility model – MODEL FOR THE FULL PANDEMIC PERIOD

In determining parameters that define the impact of related factors (variables) on audit fees in the full pandemic period, regardless of the specific nature of individual pandemic years, year 2020 is described as Year 1. The year 2021 is designated as Year 2 and the year 2022 as Year 3. The confidence level is 95%, and the significance level is 1%. This model (as well as other models described further herein) is tested using Gretl software, an open source statistical package.

Table 3. Model for the full pandemic period Least-squares estimation

Dependent variable (Y): Audit Revenue

Coefficient	Value of coefficient	Standard error	Student's t-test	p-value
Const	10,872.3	147.49	73.72	<0.0001
Relative Year (year – 2019)	1,152.92	51.89	22.22	<0.0001
High Season	-870.58	107.19	-8.122	<0.0001
Distance (km)	12.55	0.39	31.95	<0.0001

Coefficient	Value of coefficient	Standard error	Student's t-test	p-value
SSF	-1,553.20	209.89	-7.400	<0.0001

Test for normal distribution of residuals
Null hypothesis: a random element has a normal distribution
Test statistic: Chi-square(2) = 83,169.4
with p-value = 0

Source: Own calculations based on the data available from PANA – Database of Annual

Reports of Audit Firms, 2020–2022, using the Gretl statistical package

The above calculations allow for the model for the full pandemic period to be presented in the form of the following formula (Equation 3):

Equation 3.

Audit Revenue = 10,872.30 + 1,152.92 x (Year–2019) - 870.58

x High Season + 12.5471 x Distance - 1553.20 x SSF

Table 4 below presents values of coefficients (parameters in the model) at the assumed 95% confidence level.

Table 4. Parameters in the model for the full pandemic period, along with the limits for the 95% confidence interval

Dependent variable (Y): Audit Revenue

Coefficient	Value of coefficient for the full pandemic period (2020–2022)	Confidence interval of 95%
Const	10,872.30	[10,583.2, 11,161.4]
Relative Year (year – 2019	1,152.92	[1,051.22, 1,254.61]
High Season	-870.580	[-1,080.68, -660.48]
Distance (km)	12.55	[11.78, 13.33]
SSF	-1,553.20	[-1,964.59, -1,141.82]

Source: Own calculations based on the data available from: PANA – Database of Annual

Reports of Audit Firms, 2020–2022, made with the use of the Gretl statistical package

Analysing the results obtained relating to the size of the constant – the value of 10, 872.30 is the expected audit fee in the period other than the high season in close proximity (up to 10 km) in 2019. The parameter related to the *Year* factor informs that in each subsequent year the revenue will grow on average by about PLN 1,152 per year. This will be verified by creating analogous models for each year of the pandemic period separately. However, at this point, it is worth pointing out that information included in the studies presented on the website of the Polish Agency for Audit Oversight for the years 2020–2022 shows that the annual growth in audit fees is likely to be linked to an increase in inflation (Baklarz, Kreis, 2021; 2022; 2023. The model also shows that *Audit Revenue* is weakly dependent on the distance between the audited entity and the audit firm. This is because the increase in revenue is not significant, as it is only about PLN 12 per each kilometre of distance. Interestingly (and unexpectedly), the high season price is PLN 870 less than the low-season price. (An overview of possible interpretations of this finding is presented later herein.) Equally interesting (although expected in the context of information contained in publications made available on the PANA website), the price for auditing consolidated statements is PLN 1,553 less than the price for auditing financial statements.

In the next section, analogous models for each of the pandemic years are presented in order to verify whether their parameters fall within the ranges indicated.

4.2. Determination of parameters for the audit fee volatility model – MODEL FOR THE FIRST YEAR OF THE PANDEMIC

The model for the first year of the pandemic is based on the following characteristics of the audit services rendered in that period:

    a) the audit fee (dependent variable: *Audit Revenue*),

    b) the month(s) of high or low season in which services are provided (independent variable: *High Season*, which is 1 for March, April, May, June, July and September and 0 for the remaining months),

    c) the distance in km between the audited entity and the audit firm (independent variable: *Distance*),

    d) the type of the financial statements audited (independent variable: SSF, which is 1 for consolidated financial statements and 0 for individual financial statements).

The function described by the aforementioned variables for the first year of the pandemic is presented as Equation 4 below.

The confidence level adopted is 95% and the significance level is 1%. The model was also tested using the Gretl software, an open source statistical package.

Equation 4.

Audit Revenue = Const + b x High Season + c x Distance + d x SSF

The results of model testing (Table 5) indicate the high probability of a match between the model and the data.

Table 5. Model for the first year of the pandemic Least-squares estimation

Dependent variable (Y): Audit Revenue

Coefficient	Value of coefficient	Standard error	Student's t-test	p-value
Const	11,945.70	175.72	67.98	<0.0001
High Season	-621.40	183.14	-3.393	0.0007
Distance (km)	13.46	0.65	20.63	<0.0001
SSF	-2,136.67	362.36	-5.897	<0.0001
Test for normal distribution of residuals Null hypothesis: a random element has a normal distribution Test statistic: Chi-square(2) = 36004.9 with p-value = 0				

Source: Own calculations based on the data available from PANA – Database of Annual

Reports of Audit Firms, 2020–2022, using the Gretl statistical package

Transforming Equation 3, for the year 2020, we arrive at Equation 5.

Equation 5.

Audit Revenue

=10,872.30 + 1,152.92 x (2020–2019) - 870.58 x High Season
+ 12.5471 x Distance - 1,553.20 x SSF = 12,025.22- 870.58
x High Season + 12.5471 x Distance - 1,553.20 x SSF

Table 6 presents the ranges of coefficients (model parameters) at the confidence level of 95%.

It should be noted that each of the parameters calculated for 2020 using Equation 3 falls within the aforementioned confidence intervals. This demonstrates that the two models are coherent.

Table 6. Parameters in the model for the first year of the pandemic, along with the limits for the confidence interval of 95%, as compared to the parameters in the three-year model

Coefficient	Value of coefficient for the first year of the pandemic (2020)	Confidence interval of 95%	Values of coefficient calculated for the 3-year model
Const	11,945,70	[11,601.30, 12,290.20]	12,025.22
High Season	-621.40	[-980.36 -262.43]	-870.58
Distance	13.46	[12.18, 14.74]	12.55
SSF	-2,136.67	[-2,846.93, -1,426.42]	-1,553.20

Source: Own calculations based on the data available from PANA – Database of Annual

Reports of Audit Firms, 2020–2022, using the Gretl statistical package

4.3. Determination of parameters for the audit fee volatility model – MODEL FOR THE SECOND PANDEMIC YEAR

The model for the second year of the pandemic is based on the following characteristics of the audit services rendered in that period:

a) the audit fee (dependent variable: *Audit Revenue*),

b) the month(s) of high or low season in which services are provided (independent variable: *High Season*, which is 1 for March, April, May, June, July and September and 0 for the remaining months),

c) the distance in km between the audited entity and the audit firm (independent variable: *Distance*),

d) the type of the financial statements audited (independent variable: SSF, which is 1 for consolidated financial statements and 0 for individual financial statements).

The function described by the variables is presented as Equation 4 above.

The confidence level adopted is 95% and the significance level is 1%. The model was also tested using the Gretl software, an open source statistical package. Again, the results of model testing indicate the high probability of a match between the model and the data (Table 7).

Table 7. Model for the second year of the pandemic Least-squares estimation.

Dependent variable (Y): *Audit Revenue*

Coefficient	Value of coefficient	Standard error	Student's t-test	p-value
Const	12,665.00	172.35	73.48	<0.0001
High Season	-583.09	180.33	-3.234	0.0012
Distance (km)	11,47	0.66	17.40	<0.0001
SSF	-1,094.40	327.52	-3.341	0.0008
Test for normal distribution of residuals Null hypothesis: a random element has a normal distribution Test statistic: Chi-square(2) = 22636.6 with p-value = 0				

Source: Own calculations based on the data available from PANA – Database of Annual Reports of Audit Firms, 2020–2022, using the Gretl statistical package

Transforming Equation 3, for the year 2021, we arrive at Equation 6.

Equation 6.

Audit Revenue

$$= 10.872,30 + 1.152,92 \times (2021\text{-}2019) - 870,58 \times High\ Season$$
$$+12,5471 \times Distance - 1.553,20 \times SSF = 13.178,14 - 870,58$$
$$\times High\ Season + 12,5471 \times Distance - 1.553,20 \times SSF$$

Table 8 presents the ranges of coefficients (model parameters) at the confidence level of 95%.

Table 8. Parameters in the model for the second year of the pandemic, along with the limits for the confidence interval of 95%, as compared to the parameters in the three-year model

Coefficient	Value of coefficient for the second year of the pandemic (2021)	Confidence interval of 95%	Values of coefficient calculated for the 3-year model
Const	12,665.00	[12,327.20, 13,002.80]	13,178.14
High Season	-583.10	[-936.55, -229.64]	-870.58
Distance	11.47	[10.17, 12.76]	12.55
SSF	-1,094.40	[-1,736.36, -452.430]	-1,553.20

Source: Own calculations based on the data available from PANA – Database of Annual Reports of Audit Firms, 2020–2022, using the Gretl statistical package

It should be noted that the variables of High Season, Distance and SSF calculated for 2020 using Equation 3 fall within the aforementioned confidence intervals. However, the value of the constant falls outside the confidence interval. This may indicate that the constant value is somehow dependent on the parameter based on other factors.

4.4. Determination of parameters for the audit fee volatility model – MODEL FOR THE FINAL PANDEMIC YEAR

Again, the model for the final pandemic year is based on the following characteristics of the audit services rendered in that period:

    a) the audit fee (dependent variable: *Audit Revenue*);

    b) the month(s) of high or low season in which services are provided (independent variable: *High Season*, which is 1 for March, April, May, June, July and September and 0 for the remaining months),

    c) the distance in km between the audited entity and the audit firm (independent variable: *Distance*),

    d) the type of the financial statements audited (independent variable: SSF, which is 1 for consolidated financial statements and 0 for individual financial statements).

The function described by the variables is presented as Equation 5 above.

The confidence level adopted is 95% and the significance level is 1%. Again, the model was tested using the Gretl software, an open source statistical package. And

again, the results of model testing indicate the high probability of a match between the model and the data.

Table 9. Model for the third year of the pandemic Least-squares estimation

Dependent variable (Y): Audit Revenue

Coefficient	Value of coefficient	Standard error	Student's t-test	p-value
Const	14,880.90	183.18	81.24	<0.0001
High Season	−1,367.73	192.69	−7.098	<0.0001
Distance (km)	12.76	0.73	17.56	<0.0001
SSF	−1,475.47	406.72	−3.628	0.0003
Test for normal distribution of residuals Null hypothesis: a random element has a normal distribution Test statistic: Chi-square(2) = 31134.5 with p-value = 0				

Source: Own calculations based on the data available from PANA – Database of Annual

Reports of Audit Firms, 2020–2022, using the Gretl statistical package

Transforming Equation 3, for the year 2022, we arrive at Equation 7.

Equation 7.

$$Audit\ Revenue = 10\ 872{,}30 + 1152{,}92 \times (2022\text{-}2019) - 870{,}58 \times$$
$$High\ Season + 12{,}5471 \times Odległość - 1553{,}20 \times SSF = 14\ 331{,}06$$
$$- 870{,}58 \times High\ Season + 12{,}5471 \times Distance - 1553{,}20 \times SSF$$

Table 10 presents the ranges of coefficients (model parameters) at the confidence level of 95%.

It should be noted that the variables of *Distance* and *SSF* calculated for 2022 using Equation 3 fall within the aforementioned confidence intervals. However, the value of the constant and the value of the coefficient for *High Season* fall outside the confidence interval. This confirms the discrepancy identified with the use of the model for 2021 that the constant (which is the expected price for auditing services rendered outside the high season in close proximity (up to 10 km)) is somehow dependent on a parameter derived from other factors, and may indicate that a dependence on another parameter concerning the variable of *High Season* also exists.

Table 10. Parameters in the model for the third year of the pandemic, along with the limits for the confidence interval of 95%, as compared to the parameters in the three-year model

Coefficient	Value of coefficient for the third year of the pandemic (2022)	Confidence interval of 95%	Values of coefficient calculated for the 3-year model
Const	14,880.90	[14,521.90, 15,239.90]	14.331,06
High Season	-1,367.73	[-1,745.41, -990.05]	-870,58
Distance	12.76	[11.34, 14.19]	12.5471
SSF	-1,475.47	[-2,272.68, -678.27]	-1,553.20

Source: Own calculations based on the data available from PANA – Database of Annual Reports of Audit Firms, 2020–2022, using the Gretl statistical package

5. Potential interpretations of the negative value of the parameter set for the variable of *High Season*

As has already been mentioned, the negative sign next to the variable of *High Season* indicates that audit firms are paid higher fees outside the high season. This is an interesting reflection, especially since it may point to several potential reasons. Unfortunately, due to the specific and, in this case, inadequate information structure of the *Database of Annual Reports of Audit Firms, 2020–2022,* they cannot be fully confirmed.

In order to deepen the understanding of the negative value of the variable of *High Season*, an analysis of the audit duration was carried out. Since less than 4% of the financial statements in the database analysed relate to the shifted balance sheet date (i.e., other than that of 31 December), the author hereof analysed the number of days between the balance sheet date and the date of the audit report. The results of the analysis have been presented in Figure 3 over a period limited to 370 days (rounded up to 10 days).

In analysing (Figure 3) changes in the number of days between the balance sheet date and the audit report date (rounded to the nearest 10 days), it can be noticed that their distribution varied from year to year. In 2020, despite lockdown, companies seemed to comply with the obligation to have their financial statements audited within 3 months after the end of the financial year, without

major difficulties. However, in the following years the conduct of audits lost on its efficiency as a result of the time limit up having been extended up to 9 months from the balance sheet date.

The distribution of the audits completed in the high season (Figure 4) is very similar to that presented above. However, the distribution of the audits completed outside the high season is very different (Figure 5).

The audits completed outside the high season (Figure 5) can be divided into three groups:

1) audits completed within 2 months of the balance sheet date – a potential reason for an increase in remuneration may therefore be the intensification of work performed by the audit team;

2) audits completed within 7–8 months of the balance sheet date – a potential reason for an increase in remuneration may therefore be re-examination of the financial statements audited after each adjustment thereto, additionally carried out procedures, tasks performed during the holiday season;

3) audits completed within 9 and more months of the balance sheet date – a potential reason for an increase in remuneration may therefore be re-examination of the financial statements audited after each adjustment thereto, additionally carried out procedures (e.g., because the lapse of time after the balance sheet date, the need to verify events after the balance sheet date in the relevant period), intensification of tasks for entities that forgot to have their financial statements audited.

Thus, without prejudging the accuracy of the reasons for the negative value of the coefficient for the variable of *High Season*, it can be concluded that there are three main reasons for which this value is negative. They are presented in detail below.

Reason 1: Audit firms typically contract new audits between August and December of the preceding year in an effort to first secure a pool of audits up to their break-even point. That is, even having their own price lists set, they can gently compete on price (approx. 5–7% of the price) so as to ensure that they can operate in the times of high occupancy. Subsequent audits that are in excess of the break-even point are priced at higher rates as more heavily burdening, and thus they are also measured by a lost benefit in the form of a loss of free time by those carrying out the audits.

Reason 2: The post-season audits are usually conducted for entities that contract such services late and cannot find potential contractors. Consequently, competition is low and an audit firm can discount the lost benefit in the form of a loss of vacation time or other time which would otherwise be spent on doing other activities.

Reason 3: The post-season audits are often characterised by a higher risk. For example, entities want to contract auditing services too late for a statutory auditor to participate in the stocktaking and additional procedures have to be carried out which increases the audit fee.
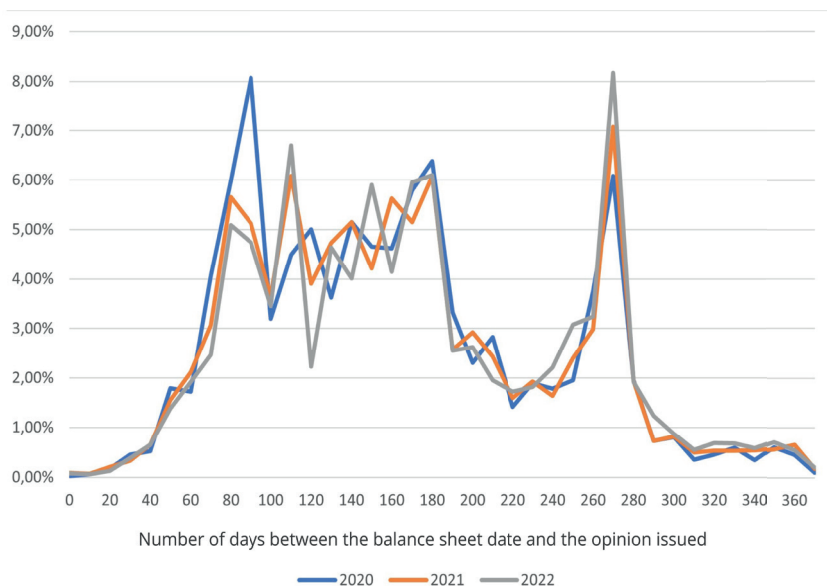

Figure 3. Percentage distribution of audits conducted in 2020–2022, by number of days between the balance sheet date and the opinion issued on the audit of financial statements

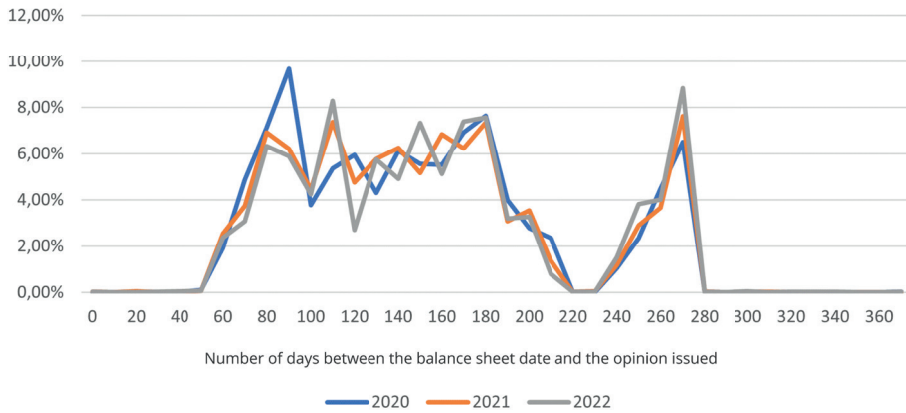Source: Own calculations based on: PANA – Database of Annual Reports of Audit Firms, 2020–2022

Figure 4. Percentage distribution of the period between the balance sheet date and the audit opinion issued in 2020–2022 for audits completed in the high season

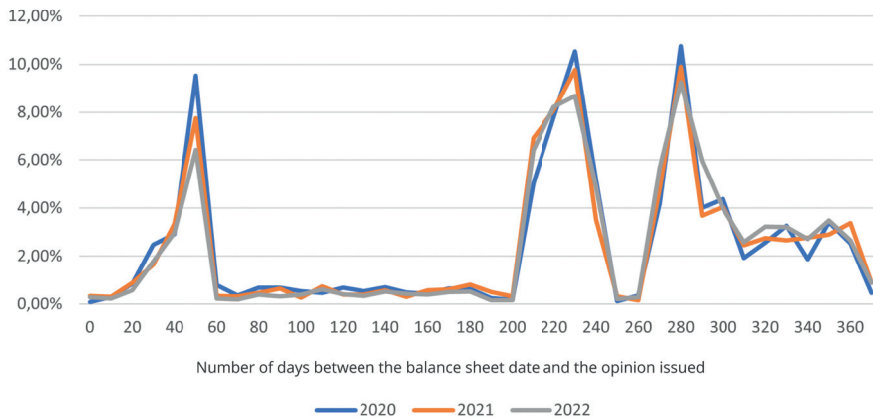Source: Own calculations based on: PANA – Database of Annual Reports of Audit Firms, 2020–2022

Figure 5. Percentage distribution of the period between the balance sheet date and the audit opinion issued in 2020–2022 for audits completed outside the high season

Source: Own calculations based on: PANA – Database of Annual Reports of Audit Firms, 2020–2022

Summary

The analyses carried out confirmed that the following factors had a real impact on the audit fees paid to audit firms for services provided to entities other than public interest entities during the pandemic:

    a) the year (of the pandemic period) in which the services were provided, with fees earned outside the high season being comparatively cheaper by about PLN 870 each year,

    b) the distance (measured in km in a straight line) between the audited entity and the audit firm,

    c) the type of the financial statements audited, with audits of consolidated financial statements being cheaper by about PLN 1,500 than audits of separate financial statements.

In conclusion, it can be stated that the aforementioned interrelation between the audit fees and the identified factors is described well by the general formula and by the ranges of parameters

Audit Revenue =

Const + a × (Year-2019) + b × High Season + c × Distance + d × SSF

where:

- *Const is between PLN 10.583 and PLN 11.161,*
- the coefficient a is between 1.051 and 1.254,
- the factor b is between -1.080 and -660,
- the factor c is between 11.777 and 13.317,
- the factor d is between -1.964 and -1.141.

However, it should be clearly pointed out here that the value of *Const* should be subjected to further verification in terms of dependence on macroeconomic factors. Additional analyses have also made it possible to note that:

    a) the pandemic on had an impact on the month in which the audit of the financial statements was completed; this is indicated by an increasing postponement of the completion of the audit, i.e., until the cut-off time in a given year, applicable in accordance with the provisions of law;

    b) the distance between the audit firm and the audited entity changed in the pandemic period, and in particular that changes in the median distance were not significant, but were constantly increasing, and could possibly reflect changes which the audit firms made to their mode of operations (remote) in response to the pandemic circumstances;

    c) the audits of financial statements were characterised by seasonality which had an impact on that audit fees.

The analysis carried out has not been exhaustive of all the factors that may be relevant to the audit fees for audits conducted during the pandemic period. Pandemic conditions in Poland were far more complex than those whose characteristics have been made available in the *Database of Annual Reports of Audit Firms for 2020–2022*, created at the Polish Agency for Audit Oversight. As a result of the foregoing, the reasoning presented and the resulting model can be further developed, supplemented with factors and interrelated macroeconomic parameters that characterised the Polish economy during the pandemic. Such an analysis can also serve as an inducement to conduct comparative analysis at a global scale, and to create (unfortunately, due to the global scope of the pandemic) – a cultural picture of the problem taken up.

In expressing hope that the situation does not repeat, the modelling done can nevertheless be viewed as cognitive in terms of the audit firms' response to the health pandemic crisis contributing to a change in approach and greater use of IT tools in auditing.

The author believes that the study of factors affecting audit fees should be extended beyond the pandemic period in order to gain the understanding of the processes initiated in the period concerned.

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