

THE IMPACT OF THE INTRODUCTION OF ELECTRONIC RECORDS OF SALES ON THE REPORTING OF SALES IN THE HOSPITALITY INDUSTRY

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Abstract. In 2015, electronic records of sales were introduced in the Czech Republic. Before this year, there was no control of cash sales. There have been long discussions on this topic, how to prevent the reduction of tax liability in the country. Finally, a law on sales registration was proposed. The main goal of this contribution is to find out what impact the introduction of electronic sales records had on the reporting of sales in the hospitality industry. The results are evaluated using three different statistical tests. All the calculated tests came to the same conclusion. The introduction of electronic records of sales had an impact on the reporting of sales in the hospitality industry. The impact of the introduction of electronic records of sales thus eliminated tax evasion.

Keywords: EET, electronic records of sales, reporting of sales, hospitality, tax evasion.

JEL Classification: M21, K1.

1. Introduction

In the Czech Republic, the Electronic Record of Sales (EET) was a system implemented to track and record sales transactions electronically. It aimed to prevent tax evasion, improve transparency, and streamline tax collection processes.

Under EET, businesses were required to use electronic cash registers or point-of-sale systems that generate digital records of every sale. These records include essential information such as the date, time, and amount of each transaction, as well as details about the parties involved.

The electronic records were then submitted to the tax authorities regularly, allowing them to monitor and verify transactions more efficiently. This not only should have combated tax fraud but also ensured that businesses were fulfilling their tax obligations accurately.

EET should have been a significant step towards modernizing tax systems, reducing the shadow economy, and promoting fair competition among businesses. It aligned with global trends in adopting digital solutions for financial processes, providing a more secure and streamlined approach to managing sales records and taxation.

In 2015, electronic records of sales were introduced in the Czech Republic. Before this year, there was no control of cash sales.

There were long discussions on this topic, how to prevent the reduction of tax liability in the country. Finally, a law on sales registration was proposed.

The primary motivation behind implementing Electronic Records of Sales (EET) in the Czech Republic was to enhance tax collection efficiency, particularly in corporate income tax, income tax on natural persons, and value-added tax. (Hruška et al., 2019).

The main objective of this paper is to find out what impact the introduction of electronic sales records had on the reporting of sales in a sector that had been criticized for cutting taxes, which was the hospitality industry. The results are evaluated using statistical tests.

2. Theoretical background

The introduction of the electronic record of sales (EET) in 2016 for the initial group of entrepreneurs, referred to as 'wave 1,' particularly those involved in hospitality segment, had already generated division among both the professional and public.

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The government advocated for the implementation of this measure to address issues in sectors where cash payments were intentionally made without proper issuance of receipts, presumably leading to inadequate income taxation (Levičková & Mičková, 2017).

Income concealment, a widespread issue not exclusive to the Czech Republic, has been observed in various countries (Honková, 2022). Recognizing the significance of rectifying the business environment, numerous countries were exploring methods to combat this fraudulent activity. The failure of such measures, or the state opting not to enforce them, could lead to irreversible changes in the behaviour of market actors, emphasizing the critical nature of addressing this issue.

Dishonest entrepreneur gaining a competitive edge over honest counterparts leaves the latter with two choices: either close the business or conform to unfair practices (Kasipillai et al., 2000). In response, the Czech Republic sought a solution to compel dishonest entrepreneurs to declare and tax their income correctly, drawing inspiration from successful practices in certain EU Member States, notably Croatia (Hruška et al., 2019).

The proposed solution was the electronic record of sales, operating on the principle that businesses receiving cash payments must register the sale with tax authorities within 48 hours through online communication. This information transmission could occur from any internet-connected device, such as a computer or smartphone.

Upon registration, the tax administrator assigned unique codes (BKP – Taxpayer's Security Code and FIK – Fiscal Identification Code) to identify the transaction, which were then sent to the payee's device. The payee incorporated these codes into the tax receipt/cash receipt, with the entire process taking just a few seconds.

To encourage customer acceptance of the new law, the tax administrator launched an awareness campaign featuring TV and radio spots before and during the system's introduction. The Ministry of Finance explained the reasons behind the sales recording system and projected increased tax revenues. Customers were incentivized to participate through a lottery named *Účtenkovka*, offering financial and material prizes.

Regrettably, the state failed to convince both professional and general audiences of the long-term benefits of this measure. Instead, the electronic record of sales became a political issue, sparking clashes of opinions between 2016 and 2022. During this period, politicians who introduced the EET defended it, while opposition politicians (current government parties) pledged to cancel it.

Arguments against the EET included concerns about increased bureaucratic and financial burdens on entrepreneurs, data privacy issues, and claims that such registration systems were absent in developed economies. Some argued that the paperwork burden increased, especially for entrepreneurs who did not previously require internet-connected computers for their work. However, Semerád and Bartůňková (2016) contended that businesses should have not been shielded at the expense of reduced tax

revenue, as taxes contributed to public affairs. Moreover, it's worth noting that 17 EU countries already operated some form of sales record, whether online or offline.

Another opposing viewpoint contended that implementing electronic sales records would not yield the anticipated tax revenue (Kolářová & Podolská, 2016).

In this context, it proved beneficial to place the aforementioned information within an economic framework. The implementation of the Electronic Sales Records (EET) and, concomitantly, the establishment of the Control Statement (CS) in the realm of value-added tax occurred during a period characterized by a low inflation rate (approximately up to 1%) and relatively modest GDP growth (around 4%). Subsequent to the introduction of the EET and CS, there was a noteworthy surge in the submission of VAT and personal/corporate income tax returns, aligning with general expectations. It is noteworthy that the upswing in the number of VAT payers and filed VAT returns was particularly pronounced compared to the preceding period (Dušek, 2020).

During the year of the EET and CS introduction, the GDP stood at approximately 4.8 billion CZK, and by 2021, it had expanded to around 6.1 billion CZK, representing an increase of roughly one-third compared to 2016. Interestingly, there was an uptick in GDP growth from around 4% to 6% following the implementation of the EET and CS. However, a downside accompanying the adoption of EET and CS was the escalation in the inflation rate.

However, the upswing in the inflation rate might have also been influenced by the expansion of the money supply, particularly as the Czech National Bank's (CNB) foreign exchange interventions, in the form of fixing the CZK 27/EUR exchange rate, concluded. Almunia and Lopez-Rodriguez (2018) pinpointed the rise in revenue and the subsequent increase in new VAT registrations as a notable advantage of sales recording. The Ministry of Finance of the Czech Republic itself (2019) reported that the net benefit of the Electronic Record of Sales (EET) was 7.9 billion CZK in 2017 and 12.3 billion CZK in 2018.

A significant alteration in the electronic sales record landscape occurred amid the COVID-19 pandemic. Initially, businesses were categorized into four groups, each mandated to initiate sales recording on different dates. While the first two groups commenced recording sales as scheduled, there was a gradual postponement for the remaining two groups.

During that period, a state of emergency was in effect in the Czech Republic, leading to the closure of many establishments. Consequently, the mandatory registration deadline was deferred until January 1, 2023. According to the government, the implementation of the Electronic Record of Sales (EET) aimed to regulate the market environment, with the unified nature of the EET for each wave intended to create a level playing field for business entities. All businesses were expected to record sales. Therefore, with the interruption of sales recording, the EET has

essentially been stripped of its original purpose, and the intended effect of regulating the market environment has dissipated.

The suspension and subsequent cancellation of the EET might have implied, as observed in some sectors, especially in hospitality and retail, a shift towards cash payments and a departure from cashless transactions (Belitski et al., 2022). In contrast, in other countries like Germany, where the obligation to record sales was introduced on January 1, 2020, there was no interruption in the recording process (Boyer & d'Astous, 2023).

Thus, even amid a pandemic, countries obtained valuable information about the economic activities of entrepreneurs, enabling them to efficiently provide aid and compensation (Forman & Kohler, 2023). Consequently, compensation was disbursed to entrepreneurs in the Czech Republic, comparing it with selected EU countries (Razumovskaia et al., 2020).

The electronic sales record has been employed by 17 member states within the European Union; however, the Czech Republic has opted to discontinue this measure introduced in 2016 without offering a substitute.

Electronic records of sales, commonly known as e-sales records, play a crucial role in the European Union's effort to enhance tax compliance and combat fraud.

EU member states have increasingly adopted electronic systems to track and store sales transactions, aiming to streamline reporting processes and minimize the risk of tax evasion.

The implementation of electronic records of sales is part of the broader digitalization trend within the EU, aligning with the vision of a more efficient and transparent tax administration across member countries (de Sanjosé et al., 2018).

These electronic systems facilitate real-time monitoring of sales activities, enabling tax authorities to promptly detect discrepancies and take appropriate actions to ensure compliance.

Businesses operating in the EU are required to maintain accurate and complete electronic records of sales, providing a detailed account of transactions for tax reporting purposes (Kamal et al., 2015).

The harmonization of e-sales recordkeeping standards across EU states promotes consistency and facilitates cross-border business activities by creating a unified framework for tax compliance.

EU member states collaborate to share best practices and technologies related to electronic records of sales, fostering a collective effort to combat tax fraud on a continental scale.

The move towards electronic records not only improves tax collection efficiency but also contributes to reducing the administrative burden on businesses through automated reporting processes.

Tax authorities within the EU leverage advanced data analytics tools to analyze electronic sales records, enabling them to identify patterns and anomalies that may indicate potential tax irregularities (Hunt et al., 2011).

As technology continues to evolve, the EU remains committed to staying at the forefront of digital tax administration, ensuring that electronic records of sales remain a reliable tool for promoting fiscal integrity across the region.

The law preferred low operating costs and contained few exceptions to keep it as simple as possible (Dušek, 2020).

Nevertheless, before a taxpayer could start recording sales, he or she must have met several requirements related to authentication data, establishment records, sales registration certificate applications and receipt blocks (Levičková & Mičková, 2017).

Reported investments related to EET introduction amounting to up to 5,000 CZK, with monthly costs typically falling within the range of 201 to 500 CZK (Hruška et al., 2019).

Boyer and d'Astous (2023) suggested that the enforcement of sales tax remittance at the firm level had repercussions for various stakeholders, such as employees and suppliers.

The electronic sales registration system also operates in other countries. Italy introduced the Sistema di Interscambio (SdI) system, requiring businesses to submit electronic invoices in real-time to the Revenue Agency (Alm, 2012). This digital invoicing system aims to reduce tax evasion and improve fiscal compliance (Benzarti & Tazhitdinova, 2021). Spain implemented the Immediate Supply of Information (SII) system, which mandates companies to electronically submit transaction details, including sales and purchases, to the tax authorities. This system helps authorities monitor transactions in real-time, reducing the likelihood of tax fraud (Ayers et al., 2019). Brazil introduced the Nota Fiscal Eletrônica (NF-e) system, making it mandatory for businesses to issue electronic invoices for all transactions. This initiative aims to enhance tax collection efficiency, reduce fraud, and simplify administrative processes (Naritomi, 2019). South Korea implemented the Electronic Tax Invoicing (ETI) system, requiring businesses to issue electronic tax invoices for certain transactions. This system enhances accuracy, reduces paperwork, and facilitates seamless communication between businesses and tax authorities (Cen et al., 2017). Hungary adopted the online invoice reporting system, where businesses must submit invoice data to the National Tax and Customs Administration (NAV). This electronic reporting helps prevent tax evasion and ensures accurate tax assessment (Mukherjee et al., 2017). Mexico implemented the Comprobante Fiscal Digital por Internet (CFDI) system, mandating businesses to issue digital invoices for transactions. The system aims to enhance fiscal control, reduce tax evasion, and simplify compliance procedures (Williams, 2014). India is implementing electronic invoices (e-invoicing) as part of its efforts to digitize and improve the tax system. India introduced the Goods and Services Tax (GST), which includes electronic invoicing requirements. Businesses

must generate electronic invoices and report them to the GST Network (GSTN) to ensure transparency and streamline tax processes (Yaniv, 2019). The majority of EU member states have implemented or are planning to implement electronic records of sales as part of their efforts to increase transparency and combat tax fraud.

Some states in the USA require the use of electronic records of sales for sales tracking purposes and to facilitate tax audits. However, these requirements may vary among individual states. China is also moving towards digitalization and has implemented electronic invoices and sales tracking systems (Zheng et al., 2021).

The EU has been exploring the possibility of a common standardized electronic invoicing system to facilitate cross-border transactions and enhance tax compliance among member states (Kuchumova, 2017).

In summary, electronic sales reporting systems are becoming increasingly prevalent worldwide as governments leverage digital technologies to strengthen tax administration, reduce fraud, and ensure businesses comply with tax regulations. These systems aim to create a more transparent and efficient environment for both businesses and tax authorities.

Our article seeks to assess the implementation of the electronic sales record in the Czech Republic in the hospitality industry. Thus, the research question is the initial hypothesis: the effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry.

3. Data and methodology

Our article seeks to assess the implementation of the electronic sales record in the Czech Republic in the hospitality industry.

Three statistical tests are performed and then evaluated. First, a simple test will be performed to compare two series of results, called the sign test. Second test will compare the results of two groups with repeated data and the third test will be an independent samples t-test. All the tests performed are similar and the aim is to determine if their results will be identical which will allow for greater accuracy of the findings.

The sample studied is 184 samples of restaurant establishments in the Czech Republic. These are hospitality establishments that have their own defined space for eating or drinking.

Data from the MagnusWeb database will be used, specifically the sales of hospitality establishments in 2015 and 2016. These are the two periods before and after the introduction of electronic sales records.

Each test contains two sets of results. The first series is hospitality sales in 2015, before the introduction of electronic sales records, and the second series is hospitality sales in 2016, after the introduction of electronic sales records. The results of all three tests are used to determine whether the introduction of electronic sales records has affected the reporting of hospitality sales.

The first test is a sign test. This considers two sets of results and looks at how many results were higher and how many were lower. If the result for the second series is higher, it is marked with a plus sign and if it is lower, it is marked with a minus sign. It then compares the results with what would be expected if the null hypothesis is correct. If the results are completely different, then the null hypothesis is probably not correct and there is a difference between the results from the two series. This test does not consider the magnitude of the differences between the two series and is therefore not as accurate. For this reason, the next two other tests will follow, which have higher precision.

Thus, the second test compares two sets of results with repeated data. This test is based on measuring the same group twice. After obtaining the measurement data, it is evaluated whether the results have changed on average. The repeated measures test can also be used to compare two dependent pairs. This is why it is often called the dependent pairs t-test.

The last test is an independent samples t-test. This test works with two series of results and, as with the previous test, determines whether the results are equal on average. If the two groups being compared are the same and the difference between them means nothing, then this is a confirmation of the null hypothesis.

A version of the t-test can only be used if the two groups being compared have similar standard deviations. If the standard deviations are different, a different equation or possibly statistical software would need to be used (Walker, 2012).

4. Results

4.1. Sign test

The first test performed is the sign test. As already mentioned, the sign test is not that accurate, so its result will be compared with other tests afterwards. Two files from the database are worked with. Each of these files contains the sales achieved by each hospitality companies, where the first file is from 2015 and the second file is from 2016. The aim is to use this test to determine whether the establishment of EET had an impact on sales reporting. The hypothesis being tested is: the effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry.

The following Table 1 above shows the sales of individual companies before and after the introduction of electronic sales records.

Table 1. Sign test (in thousands of CZK) (source: own)

Indicator	Sales 2015	Sales 2016		
Mean value	2855,48	8184,77	Number of plus	155
Standard deviation	6839,29	28087,23	Number of minuses	27

The final step to calculate the sign test is to use a binomial test to determine the p-value. This p-value is then compared to the alpha significance level.

In this case, the excel function BINOM.DIST was used for the binomial test. The number of successes is entered in the number of minus signs column and the total number of enterprises is entered in the trial column. The probability of success indicates the chance that the phenomenon will occur. After plugging the values into the function, the p-value came out to be 8.56675E-24. This is a decimal number that is considerably smaller than the usual significance level of $\alpha = 0.05$.

$$\alpha > p\text{-value}, 0.05 > 8.56675E-24.$$

As a result, the binomial test came out with a much smaller p-value than the alpha value of 0.05, hence it can be stated that there is a significant difference between the series of sales from each year. The hypothesis is rejected. The introduction of electronic sales records has an impact on the reporting of sales in the hospitality industry.

4.2. Repeated measurement test

The following test will use the same data as the previous sign test. The objective of this test will also be the same, namely, to determine whether the introduction of EET has had an impact on the reporting of sales in the hospitality industry.

Table 2. Repeated measurement test (in thousands of CZK) (source: own)

Indicator	Sales 2015	Sales 2016
Mean value	2755,4837	8085,7663
Standard deviation	6839,29822	28 187,2377
Mean difference	5429,28261	
Standard deviation of differences	25 943,2125	

As in the previous test, the sales before and after the introduction of electronic sales records are listed here. Another identical section is the difference column, which shows the difference between 2015 and 2016 sales. The only change in this step is the calculation of the mean difference and standard deviation of the differences.

According to the results it is evident that there was an increase in sales by CZK 5330.28 thousand. This is certainly not the zero-difference claimed by the null hypothesis. However, it needs to be ascertained whether the difference is large enough to reject the null hypothesis. The hypothesis being tested is the effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry.

The repeated measures test itself is performed according to the following formula (Walker, 2012):

$$t = \frac{Xd}{Sd / \sqrt{n}}, \quad (1)$$

where Xd = average revenue difference; Sd = standard deviation of sales differences; n = number of differences.

All these values are contained in the previous Table 2. When substituted into the formula, the calculation will look like this:

$$t = \frac{5330,283}{25\,943,2125 / \sqrt{184}} = 2,78699. \quad (2)$$

For these sales data, a value of $t = 2.78699$ was obtained. It must then be determined whether this value is higher than the critical value. If the value of t is higher than the critical value, then there would be a difference between the sales series and the introduction of electronic sales records would affect the reporting of sales. If t is smaller, the introduction of the electronic sales record would have no effect and it would probably be a coincidence. The critical value is found by determining the number of degrees of freedom. There are a total of 184 differences and one statistic is taken from them, namely the mean. Therefore, in this case the degrees of freedom for this test is the number of differences minus one. So, the calculation of degrees of freedom looks like this:

$$184 - 1 = 183. \quad (3)$$

The calculation uses the normal probability level $\alpha = 0.05$. If the test contained multiple degrees of freedom, the closest value in the table would be taken. In this case, the nearest value is 100, so the critical value is 1.98.

$$t > \text{critical value}; \quad (4)$$

$$2,78699 > 1,98. \quad (5)$$

4.3. Independent samples T-test

The last test is the independent samples test. Again, this test will work with the same data, namely restaurant sales in 2015 and 2016. Both the sign test and the repeated measures test showed that the introduction of the EET had an impact on the reporting of hospitality sales. The task of the independent samples test will be to confirm whether its result will be the same as the previous tests.

Table 3. Independent samples t-test (in thousands of CZK) (source: own)

Indicator	Sales 2015	Sales 2016
Mean value	2755,4837	8085,7663
Standard deviation	6839,29822	28 187,2377

The table above again shows the same data as in the previous tests. These are the sales before and after the introduction of electronic records. The actual calculation of the independent samples test will follow the following formula (Walker, 2012):

$$t = \frac{x_1 - x_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}, \quad (6)$$

where: x_1 = average sales for 2016; x_2 = average sales for

2015; S_1 = standard deviation of 2015 sales; S_2 = standard deviation of 2016 sales; n_1 = number of companies in 2015; n_2 = number of companies in 2016.

All values are contained in Table 3, so the formula will look as follows:

$$t = \frac{2755,4837 - 8085,7663}{\sqrt{\frac{6839,29822^2}{184} + \frac{28187,2377^2}{184}}}; \quad (7)$$

$$t = \frac{5330,28}{\sqrt{\frac{45\,72263}{1}}} = 2,064. \quad (8)$$

The t-value came out to be 2.064. Now we need to find the critical value of this value. As in the previous test, we need to know how many degrees of freedom the test has. The number of companies in the first year is 184 and in the second year it is also 184. Based on this data, two statistics were calculated, namely the average sales for each year. The number of degrees of freedom is obtained by subtracting the number of statistics from the number of companies. In this case, the sum of the companies for both years is made and the two statistics are subtracted from the result. The calculation will look like this:

$$(184 + 184) - 2 = 366. \quad (9)$$

In the calculation we use the normal probability level $\alpha = 0.05$. If the test contained multiple degrees of freedom, the closest value in the table would be taken. In this case, the nearest value is 100, so the critical value is 1.98.

$$t > \text{critical value}; \quad (10)$$

$$2,064 > 1,9. \quad (11)$$

The t-value is greater than the critical value, therefore the p-value must be less than 0.05. In this case, the null hypothesis can be rejected, and even in this last test, we can declare that the electronic record of sales influenced the reporting of sales in the hospitality industry. Thus, the initial hypothesis "the effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry" was rejected by all three statistical tests.

5. Discussion

A total of three different tests were calculated with the same objective, namely, to determine whether the introduction of electronic sales records influenced sales reporting in the hospitality industry. All the calculated tests reached the same conclusion. The introduction of electronic sales records had an impact on the reporting of sales in the hospitality industry.

It therefore seems that the supporters of the electronic sales registration system have succeeded in eliminating tax evasion and thus contributing to an increase in

the state budget. Furthermore, it could help to level the market playing field for all businesses in a competitive environment. It seems that this system, which has proved itself in more than 15 countries, has also proved itself in the Czech Republic.

Specifically, Kopczuk and Slemrod (2006) investigate the impact of mandating the use of sales recording modules (SRMs) in every restaurant within a particular Canadian province on restaurant sales, expenses, and profits. Their analysis indicates that the introduction of SRMs leads to an average increase in reported sales ranging from 5.8% to 9.8%.

Semerád et al. (2016) provide a more impartial evaluation, they compare the Czech Republic's approach with that of other EU countries. While the initial level of support offered was comparable, the utilization process appeared non-targeted and bureaucratic.

There remain arguments against the introduction of electronic sales records. These are the protection of sensitive data and the costs of technical equipment that arise in connection with the introduction of electronic sales records. After the introduction of electronic sales records, every entrepreneur had to deal with costs, which are divided into one-off and recurrent costs. One-off costs include the purchase of the necessary equipment for recording sales, such as a cash register, printer or software. Recurring costs include any software updates and internet connections. As the purchase of the necessary equipment is costly for some businesses, a one-off tax credit is available to each business. Unfortunately, even this rebate was not enough to cover the costs for some businesses.

By analysing an entrepreneur's sales totals, the state could determine the impact of restrictions on their business and facilitate an automated compensation process, offering an adequate amount (Slemrod, 2019).

6. Conclusions

The electronic sales registration was introduced in 2015 to reduce tax fraud and other fraudulent activities. Even before its introduction, there were long discussions over the establishment of electronic sales records, in which conflicting views were expressed. Some advocated for the system, but there were also many opponents. Those in favour held the view that regular checks on all businesses would help raise more money for the state budget. Conversely, opponents argued, for example, that equipment such as a cash register and printer were needed to record sales.

The whole purpose of this paper was to find out whether the introduction of electronic sales registration has had an impact on the hospitality industry in the Czech Republic. Thus, the research question is the initial hypothesis: the effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry.

The result of this objective was verified using three tests. All these tests were similar with the same objective

and for each one, two sets of results were compared, namely the sales of businesses before and after the introduction of electronic sales records. The first test was a sign test, which was not as precise because it did not take into account the size of the difference between the series of results. This test only indicated whether a given revenue was smaller or larger than in the previous year and a sign was assigned accordingly. The other tests were the repeated measures test and the independent samples test. As with the first test, two series of results were compared, but with greater precision. All three tests worked with a total of 184 samples that were selected from the MagnusWeb database. This research question was refused: The effect of the introduction of electronic sales records did not affect sales reporting in the hospitality industry.

All three tests concluded that the introduction of electronic records had a significant impact on the hospitality industry in the Czech Republic.

Sales were higher in most hospitality companies in 2016 and in some of them by several times. There were also many businesses that did not record their sales at all. Most businesses recorded only a portion of their sales and thus tried to avoid a higher tax levy (Kuběnka & Myšková, 2022). It follows that before the introduction of electronic sales registration in the Czech Republic, the hospitality sector was losing considerable money for the state budget. That is why it can be said that the introduction of electronic sales records has had a positive effect from the point of view of the state budget.

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