DEVELOPMENT OF ADVERTISING SPENDING IN SLOVAKIA

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Abstract

Advertising, as one of the communication mix tools, can be considered as the most visible but also the most discussed tool. Many perceive advertising as an unwanted component of everyday life. On the other hand, the creation and examination of this phenomenon involved too much effort and time so that it could be simply disheartened and displaced. The submitted paper presents the results of the survey on development of advertising spending in Slovakia. In paper is analyzed a total of seven time series of advertising spending by media type. We calculated 582 different models for all analyzed spending timelines, from which had been model MAPE chosen as the most suitable one. The main objective of the presented paper is the usability of adaptive approaches to modeling the development of time series empirically verified on a set of monthly time series of advertising spending by media mix for the years 2005 to 2017 and their prognosis from January 2018 to December 2019. Almost all time series had very complex and irregular course with a lot of fluctuations. The quality of the forecasts was judged by the average relative error predicted by MAPE. Winters’ method used in the paper is a generalization of the exponential equalization method which, in addition to the trend component Tt, also covers the seasonal component St.

Developments of advertising spending in TV very responsively respond to the economic situation in Slovakia when it grew during the period until mid-2009, and its downward trend occurred in the crisis period (2009 and early 2010). From this period until December 2017, spending has grown, but at a much slower pace than in the first period until 2009. We can expect to see a moderately rising expenditure
as calculated from the projected forecast in the period (January 2018 to December 2019).

Total advertising spending in the pre-crisis period increased with periodic fluctuations until October 2008. During the crisis, 2009 to 2010 saw a significant reduction in total expenditure. However, the periodic fluctuation is similar to the previous period and is also significant in the next period until the end of 2017. After the crisis, growth in spending has not reached the growth rate with pre-crisis times. In the construction of the forecast, we expected a slight increase with the maintenance of periodic fluctuations.

**Keywords:** Advertising Spending, Prognosis of Development, Analysis of Time Series.

**JEL Classification:** M31, M32, M39.

1 Introduction

Advertising has evolved into a vastly complex form of communication, with literally thousands of different ways for a business to get a message to the consumer. Today’s advertisers have a vast array of choices at their disposal (Ang & Eisend, 2017). The internet alone provides many of these, with the advent of branded viral videos, banners, advertorials, sponsored websites, branded chat rooms and so much more (Rybanská, 2015). Advertising is part of our social and economic system. Within the economic system, advertising has evolved into a communication system for both consumers and enterprises. The ability of publicity in addressing the prepared messages to the target groups through the advertising and other promotion methods assigns its important role in the marketing programs of most enterprises (O’Keefe, 2017). Enterprises are actively oriented to promote their products and services on the market. Consumers have learned to rely on advertising and its forms with respect for information that could be used in their purchase decisions. The increase in advertising spending reflects the fact that marketers recognize the value and importance of advertising. Despite the challenges facing traditional advertising (Cho & Cheon, 2004), advertising is still a highly important part of the marketing mix for most successful brands (Yoo, B., N. Donthu & S. Lee, 2000).

Advertising is essentially impersonal and indirect form of market communication, whose role is to support the identified market offer in order to obtain and then also to accept the purchase of as many customers as possible (Holienčinová, 2013). Advertising includes messages that the company pays for, delivers through a mass medium and uses to persuade consumers. The three general advertising
objectives are to inform, to persuade and to remind customers. Within these broad goals, companies normally have more specific, quantified objectives, as well (Šugrová et al., 2017).

Advertising is essentially aimed at maximum efficiency. Decisions about advertising should be directed to make its efficiency even stronger, deeper and broader. All measures from the advertisement planning to its implementation must include an element of efficiency (Košičiarová, 2013). Efficiency is considered to be the dominant principle of all advertisements. And to efficiency are subordinated all matters related to the choice of advertising carriers, advertising resources, deployment time and released funds for advertising. (Kretter & Kádekova, 2011). Advertising involves investment of funds. Hence, it should produce a reasonable return on the said investment in order to assess the desirability and profitability of advertising.

General view on advertising, especially advertising spending differs. Half of all global advertising spending will be spent online by 2020, matching the worldwide combined "offline" advertising spending, such as TV, print advertisement and billboard posters, according to predictions. Digital media will take 44 percent, or $237 billion, of all ad money spent globally in 2018, reaching 50 percent, or $291 billion, by 2020. All forms of digital advertising are on the up, with search advertising the largest segment by far. Marketers are expected to spend $113 billion worldwide next year. Businesses are expected to spend $147 billion on mobile advertising of all types next year, up 27 percent. Brands have ever more ways to reach consumers and some are switching most of their ad spend online (CNBS, 2018).

Global advertising spending in 2014 and 2015 and a forecast until 2020 is as follows: in 2017, advertising spending worldwide exceeded 591 billion U.S. dollars. The source projected it would further grow to 724.1 billion by 2020. Television is the largest ad medium worldwide. In 2016, it accounted to 35.5 percent of the advertising spending. The largest advertising market was the United States with 190.8 billion U.S. dollars in advertising spending, followed by China and Japan (Statista, 2018).

Professional global advertising spending predictions have been also released by Zenith, MAGNA & Dentsu Aegis Network (2018).

The global advertising spending trends for each showed slower spending growth in 2017, with recovery in 2018 (Figure1):
- Zenith: 4.8% in 2016; 4.2% in 2017; and 4.1% in 2018;
- MAGNA: 5.9% in 2016; 3.7% in 2017; and 4.5% in 2018;
- Dentsu Aegis: 4.8% in 2016; 3.8% in 2017; and 4.3% in 2018.
Looking at the areas that will see the fastest growth, the reports are generally in agreement that the Central & Eastern European region will be among the leaders:
- For Zenith: Eastern Europe & Central Asia (+9.8%) will lead the way, while the Middle East and North Africa will see a large contraction of 18.6%;
- For MAGNA: Central & Eastern Europe will top the regional charts with growth of 7.2%; while
- For Dentsu Aegis: Central & Eastern Europe will see above-average growth of 6.6%, though this will trail the regional leader, Latin America (7%).

In terms of individual markets, Dentsu Aegis predicts that India will see the most rapid growth this year, with ad spending climbing by 13%, up from 11.9% last year.

Next up is Russia, which will flirt with double-digit growth in ad spending (9.8%) this year after an 11.4% hike last year.

MAGNA comes up with similar numbers, forecasting low double-digit growth for Russia (~10.5%) and an 11.5% gain for India. (Zenith, Magna & Dentsu Aegis Network, 2018)

Figure 1 Global Advertising Spending growth in % 2016-2018


2 Data and Methods

The use of mathematical and statistical methods in various forms of optimization practices has an irreplaceable place at the present time. This is also the case with predictions, respectively forecasts of such indicators that develop under the influence of various factors of the current turbulent economic environment in our country. The timeline is so marked by the instability of the environment, its development is often a chart reminiscent of the patient's cardiogram. Classical
methodology of analytical alignment of such time series does not achieve the required reliability. However, methodological approaches to statistical forecasting use methods which, with a high degree of reliability, can also model such an economic reality. We also advise adaptive approaches to modeling the development of time series.

The main objective of the submitted paper is the usability of adaptive approaches to modeling the development of time series empirically verified on a set of monthly time series of advertising spending by media mix for the years 2005 to 2017 and their prognosis from January 2018 to December 2019. Data for research had been obtained from Kantar Slovakia Ltd. (ww.kantarmedia.com). Almost all time series had very complex and irregular course with a lot of fluctuations. The quality of the forecasts was judged by the average relative error predicted by MAPE.

Winters’ method used in the paper is a generalization of the exponential equalization method which, in addition to the trend component $T_t$, also covers the seasonal component $S_t$. When comparing with exponential equalization, the Winters’ method is more appropriate for the time series showing the seasonal nature, because in addition to the adaptive trend estimate, the seasonal component is also adaptively estimated, so that, predictions are more accurate. For simplicity, the description of the Winters’ method will be limited to the case where the trend component of the analyzed time series can be considered linear in the short stretches of the line in the following formula (1):

$$LF_j^t = 100 \frac{x_j^t - m_j^t}{x_j^t + m_j^t} - \frac{\sum_{j=1}^{N} (x_j^t - m_j^t)}{\sum_{j=1}^{N} x_j^t + m_j^t}$$

as in the case of double exponential equalization, because this assumption is practically realistic in practice. Multiplicative and additive decomposition works with three equalization constants $\alpha$, $\beta_0$ and $\beta_1$ from the interval (0,1). Their values should be optimally selected in the first phase of the Winters’ method. Let $L$ denote the number of observations (seasons) per year. The estimates of parameters $\beta_0$ and $\beta_1$ and the seasonal component $S_t$ constructed at time $t$ are denoted as $b_0(t), b_1(t)$ and $s_t(t)$.

Let’s formula (2):

$$a_0(t) = b_0(t) + b_1(t)t \ (2)$$

denotes an estimate of the trend level at time $t$ constructed at time $t$. The pair of estimates $b_0(t)$ a $b_1(t)$ or $a_0(t)$ a $b_1(t)$ describe the linear trend in an equivalent way (only the start of the time gauge is changed). For some formal reasons, only the estimates $a_0(t), b_1(t)$ a $s_t(t)$ will be used in the next interpretation.
Multiplier Winters’ Method

In this method, we assume a multiplier decomposition of the time line as follows (3): \( y_t = TS_E_t \) (3)

The relevant recursive relationships for the calculation of \( a_0(t) \), \( b_1(t) \) and \( s_t(t) \) at the transition from time \( t-1 \) to time \( t \), when is given the new value \( y_t \) of the given time series as follows (4,5,6):

\[
a_0(t) = \alpha \frac{y_t}{S_{t-L}(t-L)} + (1 - \alpha)(a_0(t - 1) + b_1(t - 1)) \quad (4)
\]

\[
b_1(t) = \beta(a_0(t) - a_0(t - 1)) + (1 - \beta)b_1(t - 1) \quad (5)
\]

\[
s_t(t) = \gamma \frac{y_t}{a_0(t)} + (1 - \gamma)s_{t-L}(t - L) \quad (6)
\]

When calculating the estimates \( a_0(t) \), \( b_1(t) \) and \( s_t(t) \), then the prediction of the value constructed at time \( t \) takes following form (7):

\[
\hat{y}_{t+\tau}(t) = (a_0(t) + b_1(t)\tau)S_{t+\tau-L}(t + \tau - L) \quad (7)
\]

In this relationship, we use an estimate \( s_{t+\tau-L}(t + \tau - L) \) rather than an estimate \( s_{t+\tau}(t + \tau) \). However, it can happen that \( \tau > L \) and the index \( t + \tau - L \) therefore apply to the period for which the seasonal component is not yet known. In that case is needed to use an estimate \( s_{t+\tau-2L}(t + \tau - 2L) \) etc.

For \( \tau = 0 \), the relation (7) equals the value \( \hat{y}_t \) of the considered time series (3) deprived of random fluctuations.

Additive Winters’ method

We assume an additive decomposition of the time series in the following form (8):

\[
y_t = T_t + S_t + E_t \quad (8)
\]

The same designation as the previous method applies (9, 10,11):

\[
a_0(t) = a(y_t - S_{t-L}(t - L)) + (1 - a)(a_0(t - 1) + b_1(t - 1)) \quad (9)
\]

\[
b_1(t) = \beta(a_0(t) - a_0(t - 1)) + (1 - \beta)b_1(t - 1) \quad (10)
\]

\[
s_t(t) = \gamma(y_t - a_0(t)) + (1 - \gamma)s_{t-L}(t - L) \quad (11)
\]

For initial estimates \( a_0(t) \), \( b_1(t) \) a \( s_t(t) \), \( t = 1 - L, ..., 0 \) can be taken, for example, estimations obtained by the regression method with auxiliary variables. Prediction of the value \( y_{t+\tau} \) constructed at time \( t \) is following (12):

\[
y_{t+\tau}(t) = a_0(t) + b_1(t)\tau + S_{t+\tau-L}(t + \tau - L) \quad (12)
\]
Where, instead of $S_{t+\tau-L}(t+\tau-L)$ is written the most up-to-date estimate of available seasonal component.

3 Results and Discussion

In paper are analyzed a total of seven time series of advertising spending by media type. We calculated the different models for all analyzed spending timelines, from which had been model MAPE chosen as the most suitable one (the average absolute percent error of the forecast given in the last row of Table 1). The development of advertising spending for the whole period from January 2005 to December 2017 is presented in Figure 2.

Figure 2 Development of total Advertising Spending from January 2015 to December 2017

Source: Own calculations, output in SAS, based on data provided by Kantarmedia, 2018.

Total advertising spending in the pre-crisis period increased with periodic fluctuations until October 2008. During the crisis, from 2009 to 2010 is seen a significant reduction in total spending. However, the periodic fluctuation is similar to the previous period and is also significant in the next period until the end of 2017. After the crisis, growth in spending has not reached the growth rate with pre-crisis times. In the construction of the forecast, we expected a slight increase with the maintenance of periodic fluctuations. The development of the prediction from January 2018 to December 2019 is shown in Figure 3.
The calculated prediction confirmed our assumptions about periodic fluctuations as well as moderate growth which did not reach the pre-crisis tempo. For a detailed analysis of advertising spending by media type, we can see that the major part of advertising spending have been confirmed on Slovak TVs.

The development of the time series of advertising spending on Slovak TVs in the period from January 2005 to December 2017, as well as the calculated prediction from January 2018 to December 2019, are summarized in Figure 4.
Developments in advertising spending on TV very responsively respond to the economic situation in Slovakia when it grew during the period until mid-2009, and its downward trend occurred in the crisis period (2009 and early 2010). From this period until December 2017, spending has grown, but at a much slower pace than in the first period until 2009. We can expect to see a moderately rising expenditure as calculated from the projected forecast in the forecast period (from January 2018 to December 2019).

The development of advertising spending on other analyzed media types is without significant decline during the crisis period and their development stagnates until the end of the analyzed period in December 2017. Even in the prediction period, the analogous development is confirmed, which was also confirmed by the calculated results of the predictions.

Source: Own calculations, output in SAS, based on data provided by KantarMedia, 2018.
Figure 5 Development of Advertising Spending on other Analyzed Media Types
Source: Own calculations, output in SAS, based on data provided by Kantarmedia, 2018.

Estimated expected values of advertising spending for all analyzed media types are given together with the error rates of the MAPE predictions (Mean Absolute Percentage Error) in Table 1.

Table 1 Estimated Expected Values of Advertising Spending by Media Type from January 2018 to December 2019

<table>
<thead>
<tr>
<th>Month Year</th>
<th>Total</th>
<th>Newspaper</th>
<th>Magazines</th>
<th>TV</th>
<th>Radio</th>
<th>Outdoor</th>
<th>Cinemas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.18</td>
<td>100, 300, 049</td>
<td>4, 355, 319</td>
<td>4, 167, 788</td>
<td>62, 555, 781</td>
<td>4, 914, 112</td>
<td>4, 775, 642</td>
<td>165, 423</td>
</tr>
<tr>
<td>2.18</td>
<td>132,160,056</td>
<td>5, 630, 460</td>
<td>6, 191, 095</td>
<td>92, 032, 897</td>
<td>5, 876, 674</td>
<td>5, 517, 012</td>
<td>322, 204</td>
</tr>
<tr>
<td>3.18</td>
<td>166, 770, 762</td>
<td>7, 065, 334</td>
<td>7, 754, 394</td>
<td>122, 160, 623</td>
<td>7, 731, 224</td>
<td>7, 060, 068</td>
<td>483, 473</td>
</tr>
<tr>
<td>4.18</td>
<td>175, 397, 606</td>
<td>6, 973, 492</td>
<td>8, 543, 245</td>
<td>129, 721, 941</td>
<td>8, 411, 623</td>
<td>7, 816, 878</td>
<td>453, 885</td>
</tr>
<tr>
<td>Month Year</td>
<td>Total</td>
<td>Newspaper</td>
<td>Magazines</td>
<td>TV</td>
<td>Radio</td>
<td>Outdoor</td>
<td>Cinemas</td>
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<td>5.18</td>
<td>178,471,912</td>
<td>7,357,929</td>
<td>8,656,152</td>
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<td>8,256,343</td>
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<td>8,299,339</td>
<td>8,065,260</td>
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<td>6,513,895</td>
<td>72,679,682</td>
<td>6,531,235</td>
<td>7,274,688</td>
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<tr>
<td>8.18</td>
<td>108,704,222</td>
<td>4,944,806</td>
<td>5,495,689</td>
<td>75,406,473</td>
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<tr>
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<td>8,150,917</td>
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<td>10.18</td>
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<td>9,738,675</td>
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<td>9,121,988</td>
<td>8,185,659</td>
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<td>11.18</td>
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<tr>
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<td>176,328,420</td>
<td>7,157,431</td>
<td>7,810,555</td>
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<td>8,036,597</td>
<td>7,563,608</td>
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<tr>
<td>5.19</td>
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<td>8,718,768</td>
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<td>8,687,293</td>
<td>8,850,807</td>
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<tr>
<td>6.19</td>
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<td>6,950,332</td>
<td>8,552,354</td>
<td>121,757,036</td>
<td>8,627,152</td>
<td>8,644,864</td>
<td>698,398</td>
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<td>7.19</td>
<td>118,547,230</td>
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<td>6,560,958</td>
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<td>8.19</td>
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<td>9.19</td>
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<td>8,736,418</td>
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<tr>
<td>10.19</td>
<td>218,259,425</td>
<td>7,505,152</td>
<td>9,808,910</td>
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<td>146,705,891</td>
<td>9,518,012</td>
<td>7,796,777</td>
<td>958,463</td>
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</tbody>
</table>

| MAPE | 3.49 | 4.21 | 3.65 | 2.98 | 3.44 | 4.31 | 3.66 |

Source: Own calculations, based on data provided by Kantarmedia, 2018.

The highest spending in the prediction period can be expected in the Slovak TVs (from € 62,555,781 in January 2018 to € 183,085,010 in November 2019). Other media are involved in substantially lower total spending (from € 4,167,788 to € 10,527,414), the smallest share of analyzed media was found in cinemas (from € 165,423 in January 2018 to € 958,463 in December 2019).

Comparing to worldwide research by leading agency for advertising Magna (2018), the global advertising spending growth is expected to reaccelerate to +4.5% in 2018, with the return of even-year events. Online advertising spending will grow by 14% this year while offline ad sales (television, print, radio, out-of-home) will decrease by 2%. Online advertising will pass the $200 billion mark,
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to become the highest category globally, with 40% of total advertising spending versus 36% for television.

Leading forecaster **Zenith** (2018) lowered its prediction for global advertising expenditure growth in 2018 to 4.1 percent to reach $578 billion by the end of the year, with marginal downgrades in North America, Western Europe and Asia Pacific. It had also estimated 4 percent growth in 2017, down from 4.8 percent in 2016.

According to **Zenith** (2018), internet advertising overtakes traditional TV this year to become the world’s largest ad medium, accounting for 37% of total spending.

The internet’s share of total advertising spending will continue to grow in the coming years as it outpaces average ad spending increases across media. With an average increase of 11% per year from 2016 through 2019, the internet is expected to account for almost 42% of global advertising spending in 2019, with display growing its lead over paid search during that timeframe. Display will be powered mainly by online video (16% per year on average between 2016 and 2019) and social media (20% per year on average), though traditional display will recover from 0.7% increase last year to see 6% growth through 2019.

As for mobile, it’s obviously climbing fast, representing 44.5% of internet ad spend last year and 15.1% of total global ad spend. By 2019, mobile will easily surpass desktop in digital ad spend, comprising almost 63% of internet ad expenditure and 26.3% of all ad spending.

Print, meanwhile, will see the opposite trend: newspaper ad spend will fall from 10.9% share of the total in 2016 to 8.3% share in 2019, while magazines will drop from 5.8% to 4.3%, respectively.

Separately, **WPP’s GroupM** (2018) said it expects global advertising spending growth of 4.3 percent in 2018.

**4 Conclusion**

When summarized the above conclusions, the achieved results convincingly indicated the application possibilities of the procedure presented by us, that adaptive approaches to modeling time series and led to the obtaining of proven quality predictions for the development of analyzed time series. Even though the presented methodology is computationally demanding to meet certain assumptions about the characteristics of the analyzed time series, the results obtained indicate the relevance of their use, especially in conjunction with powerful computing techniques and quality program processing. If we summarize the knowledge we
have gained in constructing adaptive media spending patterns, we can formulate
the following conclusions:

- The advantage of adaptive approaches to modeling time series of economic indicators is that they are flexible and quick to adapt to changes in timeline development. Stochastically model not only the trend component but also the seasonal component of time series.
- Adaptive models are also able to describe the time series of economic indicators that develop irregularly, with a changing trend, but also with a changing seasonal component. Such time series are typical for our unstable economic environment.
- Practical applications and high-quality predictions from them confirm the suitability of adaptive approaches to modeling time series when achieving the best results compared to other methods, but we often lose the possibility of simple interpretation of the calculated parameters of the resulting models.

References


