Evaluating Advertising Effectiveness: The Case Study of Moldovan Bank Advertising Campaign

By

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Abstract

Assessing the effectiveness of advertising campaigns has always been a debatable topic in the econometric literature. Using diff-in-diff and nearest neighbor matching estimators I was able to measure the impact of advertising on people's awareness and on expected sales based on the data from a Moldovan bank. Moreover, my analysis reveals that unconventional advertising has the highest impact on awareness and does not depend on country or industry particularities, which is in line with the economic theory. However, in Moldova, due to country specifics, conventional ways of advertising have a significant impact on awareness, a result which is different in the US. The research methodology and findings are valuable for companies and governments aiming at raising awareness among people.

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Introduction

Advertising has been always a very important tool of connecting people who want to sell something with the ones who have the means to use those products. Traces of advertising can be found even in ancient times and various ads were used in ancient Egypt, Babylon and Greece. The development of media and the high availability of media channels boosted advertising. From 1704 when the first newspaper ad appeared till now, advertising messages have constantly evolved into various interesting, original and even controversial forms.

Advertising has various roles, among which the most important are: informing the potential target group about the appearance of a new product or company and persuading consumers to buy some specific good or service (Ackerberg 2001). Much research has been conducted in order to find an exact number the daily ads that the average people are exposed to. A study reveals that in each day a person may be exposed to around 620 – 625 messages on average, regardless whether they were noticed or not, from which 272 come from the conventional media channels such as TV, magazines, newspapers and radio (Media Matters 2007). Moreover, Bauer and Greyser (1968) determined that per day, on average, people notice around 76 ads. These figures show that it's an enormous challenge for companies to raise awareness about their products in a world were people are bombarded with huge amounts of advertising messages. That is why in the last decades in economic literature it has been a central research topic to find of ways to capture the effectiveness of advertising campaigns (Doyle and Fenwick 1975), to model consumer behavior including various advertising related extensions (Papatla and Krishnamurthi 1992) and to make recommendations to companies or government in regards to this issue (Schwartz 1969). However the main weakness of this research is that it focuses on consumers' response to advertising. Other econometric papers study the effect of advertising on sales and vice versa from the companies' point of view. There were numerous models developed in this sense, the

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most important ones being Koyck lingering effects model (Palda 1964), current effects model (Clarke and McCann 1973), and brand loyalty model (Houston and Weiss 1975). Moreover, economists also studied the outcome of advertising on aggregate consumption using macro level data (Schmalensee 1972).

There are cases however, when data is available and sophisticated models can be developed in order to capture accurately the effectiveness of advertising. Nevertheless, in most cases the relevant information, which is needed to measure these effects, is missing. Hence my contribution to this brand of economic literature is to fill that gap by providing an example that the effectiveness of an advertising campaign can be assessed under the conditions of missing essential data.

An advertising campaign implies the usage of different media channels which are expected to have significant impact on consumers' behavior. Advising a company which media channel to use in order to transmit its message has become a very difficult task. There are plenty of factors depending country or industry specifics, which make it complicated to compare results with existing research. As a consequence, an exact framework of what media channels to include in an advertising campaign is lacking. My aim is to fill this gap by evaluating an advertising campaign of a bank in Moldova, which used two conventional and one unconventional ways of transmitting the messages.

Moldova is a country where data is scarce, the financial sector has its own unique characteristics and people are not used to the high exposure of ads. I apply in the thesis existing theories on how to assess an advertising campaign. My study confirms the hypothesis that the traditional ways of advertising yield significant results due to country specific features, but the usage of unconventional ways of transmitting an ad can have even higher impact regardless the industry particularities. Finally I argue that even if some relevant

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data is lacking, useful results can be obtained and important conclusions, which are supported by other economic research, can be drawn.

The thesis is organized as follows: first, I discuss the related literature and its connection with my research. Then the advertising campaign is described, in particular I discuss the objectives of the management and how the campaign was designed. Further I explain in details the model and the framework which allows capturing the effect of advertising. Afterwards the empirical data is presented. Then I describe the findings and provide arguments why my results are unbiased and can be applied further. Next, I double check my findings by extending my original model and using an alternative to the regression analysis called matching. Finally, I present the main recommendations, topics for further research and the conclusions.

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Chapter 1 - Literature review

The framework of the evaluated advertising campaign was designed based on the results of Ackerberg (2001) and (2003). His research separates the effects of advertising into two – prestige and informative and further assesses their impact on consumer behavior (Ackerberg 2001). Using panel data with customers' purchases for a newly launched yogurt and applying the logit and random effects models the author proved that each type of advertising has a different effect on consumers. For an inexperienced customer, it is more advisable to use informative advertising, whereas the usage of ads which make people associate a product with a favorable image has insignificant effect on experienced shoppers. Ackerberg proved that informative advertising has a significant role in influencing consumer behavior. In a later study the consumer behavior in non durable market is modeled, by analyzing both informative and prestige effects of advertising (Ackerberg 2003). Using dynamic modeling the author presents results which are consistent with his previous paper. These two papers proved that advertising has a significant impact on customers' behavior as long as it provides information necessary to make a purchase. I apply this result in my research by analyzing potential customers' awareness, which is the measure of how well the product information was transmitted.

Research analyzing and evaluating advertising campaigns can be classified into two categories. The first focuses on the way the advertising campaign has to be set up in order to separate the effects of the messages from other factors influencing customers' decision making. The alternatives on how to conduct a research on capturing the effects of an advertising campaign have been summarized by Doyle and Fenwick (1975). The main options are time-series analysis, cross-sectional analysis and experimental methods. The authors argue that the last method is most advisable as it eliminates the drawbacks of the first two. In order to prove their statement they give an example of a company which uses

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different level of advertising in its stores. In addition, in case of scarcity of data they note that the only way to assess the advertising campaign is through controlled experiments. This is exactly how the campaign analyzed in my research was set up due to the lack of data from the past. Moreover, this way of setting up an advertising campaign allowed me to differentiate between the effects of the media channels.

The second category of papers deals with the model set up, what variables to use and so on. Even before the statistical and econometric methods were widely used Schwartz (1969) provided recommendations on what variables to take into account in order to evaluate the effects of the company's communications to customers. This paper tells us that awareness of consumers and cost of transmitting the messages are the key variables for a study on assessing the effectiveness of advertising. In the thesis I measure the impact of the advertising on people's awareness and decide based on that which channel is more effective.

The actual modeling of the effects of advertising messages (advertising copies) was carried out by Gatignon (1984). The model incorporates important aspects of advertising such as: multiple exposures, multiple communication channels and responses of customers. This paper provides quantitative measures for the adverting messages' effects. I employ the same reasoning by creating a quantitative measure for people's awareness which I later use to compare results and draw conclusions.

Another example of modeling the exposure of advertising is carried by King, Siegel and Pucci (1999). The paper estimates how much are the black youth exposed to cigarette advertising using pooled probit regression. The authors used a lot of control variables in order to capture accurately the exposure of different cigarette brands. Their results show that the type of cigarettes which are more popular among the black youth are advertised more intensively in the magazines which the black youth predominantly reads. These control

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variables are appropriate in my research as well in order to double check if the results obtained fit the expectations and hold after introducing individual characteristics.

The decision regarding which media channels to employ was taken based on several papers. Eastlack and Rao (1989) using the experimental framework, measured the effects of advertising campaigns under various scenarios for a soup company. The authors argue that in this way they could control for different variables such as media selection, advertising messages strategy etc. The framework of their experiments allowed them to capture the sales response corresponding to changes in advertising budgets. Moreover, the authors found that advertising copies have a significant role and, as an additional outcome of the experiments, the overall consumption of soup was increased. Finally, the paper recommends the usage of unconventional media as well and provides a framework of how to measure the effects of different media channels. Based on this paper, the advertising campaign analyzed in this thesis was designed so it could differentiate between different media channels. Most importantly the campaign used one unusual way to advertise for a banking product. In this way I test whether unconventional media indeed yield surprising results in spite of the differences between the particularities of the soup and banking industries.

Morgan and Stoltman (2002) question the effectiveness of traditional media channels mostly used by advertisers. They prove that, unlike what people usually expect, television advertising is generally ineffective. Morgan and Stoltman conducted a controlled experiment with undergraduate students trying to assess the effects of television ads. The outcome of their experiment showed that the viewers are very likely to misperceive certain information. In addition, television advertising may cause distortion of the information disclosed for the views. Thus instead of informing consumers these ads can actually confuse them and decrease their awareness. In Moldova TV advertising is used extensively because it is generally believed to have the highest impact on people's awareness. I my research I will

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assess the impact of transmitting informative advertising through TV ads. This will allow me to confirm or refute the findings from this paper.

Advertising is very product and industry specific, and this makes it hard to compare between the effectiveness of advertising campaigns. One of the banking sector's specific characteristic is that research analyzing banks' marketing campaigns are publically unavailable since it is considered as a commercial secret. However by looking at advertising campaigns in other industries allows me to check whether their effects depend on industry particularities. Goddard and Amuah (1989), using the times series modeling tried to capture the advertising effectiveness by looking at the lagged effect of it on 4 substitute dairy products. Ward and Dixon (1989) using a cross-sectional time series model tried to capture the effectiveness of fluid milk advertising campaign. These studies are irrelevant for my research due to the fact that the analyzed Moldovan bank lacked time series data.

Using panel data containing individual household advertising exposure and frequently purchases of yogurts, Pedrick and Zufryden (1991) developed a model which fits the empirical data. Their paper measures the effect of advertising via a complex model encompassing several important aspects such as band choice, category incidence, advertising exposure and loyalty heterogeneity, which implies additionally different purchase rates and exposure probabilities in a for consumers. Their model allows prediction of brand performance over periods of time and it provided a good fit to the empirical data. This paper represents a good example what can be done once the necessary data is gathered. However for my research, it is relevant in terms of advertising exposure measurement, particularly the usage the number of products which a person remembers from an ad, which does not depend on industry specifics.

In order to capture the effects of advertising more accurately Boulding, Lee and Staelin (1994) combined a complicated model with controlled experiments framework.

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Instead of looking only at the advertising effects they evaluate the entire marketing mix including promotion and sales force activities. The question that this paper answers is whether using the mix or just some tools of it help the companies differentiate their products. The findings of this paper prove that if a company wants to differentiate and to make its message unique for consumers it has to use distinctive communication activities, including advertising. The goal of my research was not to evaluate a marketing mix; however I can check whether using distinctive way of advertising indeed helps in memorizing the features products of any company thus raising awareness about them overall.

It is common approach in economics to evaluate, beside the short-run results, the long-run effects of different marketing tools, including advertising. A good example of this approach is the paper by Jedidi, Mela and Gupta (1999) which compares the short versus the long-run outcomes of promotions and advertising on customers' buying behavior. Using a varying-parameter probit model the authors found that advertising has a positive effect in the long-term on building loyalty to a brand and thus increasing sales. This proves that amount of sales is the recommended variable for assessing accurately the effectiveness of any advertising campaign. Since the banking campaign analyzed in the thesis ended at the end of April 2010, the data for sales is unavailable yet. Still, based on the bank's historical information and opinion of its market analysts', instead a ratio between the percentage of awareness and amount of sales was provided. I will use this ratio in comparing my results and making recommendations.

Overall economists believe that the best way to assess the effects of an advertising campaign is to set an experiment in such way that one can control for an array of important variables such as: to what media channels are people exposed to, how much exposure there is, etc. This is the most effective way of research especially when there is no data on longer time spans. My research will closely follow the theoretical paper by Wooldridge and Imbens

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(2009). The basic idea is that every participant in a program has two potential outcomes, depending on the assignment to a circumstance. In order to measure the causal effect, the researcher must look at the outcome of a person under two different scenarios. However that is impossible, thus a potential outcome is always missing. This can be handled by randomly assigning groups of individuals to one of the conditions and then compare their outcomes. An important condition is that the groups must share the same characteristics on average. One has to be the treatment group and the other must be the control group; the difference in outcomes will be the effect I am looking for.

The methodology used in my research is very similar to the one used by Card and Kruger (1994). Using the double difference estimator the authors analyzed the effect of an increase in the minimum wage on employment, by looking at the data from the fast food industry. The same model with one extension is used in my research. In this manner I can capture the effect of the campaign before it starts and after it concludes, by comparing the difference in awareness in the cities.

Of course this type model is based on several important assumptions and there have been developed many statistical methods to measure the effects. Since, in empirical research people are rarely assigned randomly to some conditions, a method which solves the problem of such an assignment is matching. Basically it finds individuals with the same characteristics on average; this can be used to compare with the people participating in this campaign. This type of framework is most applicable to measuring the effects of an advertising campaign due to the nature of advertising itself. This is the methodology which I employed in this thesis in order to analyze the advertising campaign organized by a financial institution which took place between 2009 and 2010 in the Republic of Moldova.

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Chapter 2 - The Advertising Campaign

At the beginning of 2009, the management of a financial institution from the Republic of Moldova decided to launch several products on the market. The economic literature tells us that when it comes to new products a company must use informative advertising which raises awareness among the customers and to notify them about the new choices they have in making a purchase (Ackerberg 2001, 2003). The management wanted to find out which media channel would have the highest impact on consumers in terms of awareness. Due to the nature of financial products there cannot be too much differentiation, nor can the institution persuade clients to buy many products (since the amount is limited by legislation, family budget and many other factors). Thus, the major objective of the management was to inform both the existing and potential clients about the new products which were launched in order to best fit their needs via those media channels which have the biggest impact in terms of awareness. The costs of advertising were ignored due to lack of data. Although this may not be a realistic approach, the reason behind using this assumption further in the thesis is that the management had wrong information about various costs of providing advertising through different channels due to some country and sector specific issues. Usually however when it comes to decision making about the use of a certain marketing tool in order to raise awareness, the costs of this action are usually known and always taken into account.

In order to reach this goal I advised the management to pick one new product, advertise it in three different locations differently and then to compare the results before and after the campaign. My reasoning was that in this manner the important variables which the bank was interested in were controlled for. A new type of consumer loan was chosen to be advertised through three different media channels in three biggest cities in Moldova from three different regions: South, Center and North. The distance between the cities is quite large so the likelihood of some people being to exposed to one media channel in one city, then to

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travel to another city and being exposed there as well to another channel is very low. The selection of media channels were carried out based on the financial institution's experience, economic literature, market specifics and opinion of experts. Therefore the institution selected two traditional ways of advertising used in the past, which seemed to have the highest impact and one new unconventional. These ways are: advertising through TV on local channels (City A), advertising through street hoardings (City C) which are traditional ways of transmitting the financial ads, and finally advertising on public transportation (City B) which implies a combination of the previous two: there are posters on the transport means both on inside and on outside with additional one minute announcement about the product / products when the stations are announced. The latter is an unconventional way of advertising which is new in Moldova. Each campaign had the same length of time (three months) and was launched simultaneously. Thus, the time and length discrepancies were eliminated.

The bank was recommended that the ads would provide some information about other similar products as well. In this way these three media channels transmitted information not only about a new financial product but also about other similar products which the institution offered as well. Hence, it was possible to quantify awareness and measure any changes occurring before and after the campaign. The decision regarding which type of advertising should be provided in which city was chosen randomly. As a result of these decisions, in my model there is no correlation between the variables and the unobserved factors which I do not observe nor control for.

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Chapter 3 - Data Description

The data was collected by the institution through surveys, where randomly selected 500 people from each city were asked to fill in questionnaires before the advertising campaign started. There was no focus on specific regions within any city, neither whether the people are the clients of the institution, income level etc. Before the survey people were not told the purpose of this survey. It was carried out as if it was a standard procedure of getting information from random people, meaning that they were not paid or were not given any other prize for providing this kind of information. A week after the end of the campaign, a new survey was conducted. The questions from the second survey were identical to the ones from the first questionnaire. Again 500 different people from each city chosen at random were asked to fill in the surveys. No payment or any other reward system was implemented for the people questioned in this case either. The questionnaires captured as many variables as they could. Those variables were later translated into numbers and used in the model.

Since the collected data is bank's internal information and it is considered that disclosing this information may harm the performance of the institution and give the competitors a huge advantage it is not possible provide any reference to either the data or to the database itself.

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Chapter 4 - Model Description

In order to capture the effects of an advertising campaign more accurately, a dynamic model which includes some important variables such as brand loyalty and choice dynamics may be more advisable. Since this is not possible, the campaign was organized via controlled experiments framework. In this way all the researched variables such as the intensity and the timing of advertising were set to be the same in all three cities, the only difference being the way the advertising was transmitted to its target.

People participating have two potential outcomes, but only one of them will be observed - the realized one. The unobserved outcome will be missing. That is why, in order to capture any effects of advertising, it is mandatory to have at least two categories of people, who were exposed to ads and similar people who weren't. That is the only way a change can be registered and compared. Therefore we could compare the difference between the control and the treatment groups. A major limitation of any advertising campaigns is that it is impossible to make people not be exposed to some ads. Nevertheless, the way I tackled this problem was taking three cities and comparing the results between them. Hence, the treated people in one city have two control groups – the treated people from the other two cities. In this manner, when advertising will be analyzed in city A, I will compare the results with the ones from cities B and C and so on. Like in any other campaign data was gathered before the launch of this program and after it has finished. In this situation the best way to estimate the effects of advertising on an outcome is by the double difference estimator or the diff-in-diff estimator.

The main point of interest is whether people became more aware after the campaign and in which city the awareness was the highest. Since awareness is a vague concept, we will use the variable which serves as a proxy for measuring it and allows us to see if the advertising was indeed informative or not. In our case this variable will be $\boldsymbol{log\ P_i}$ which is the

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percentage change in the number of products of the institution which an interviewed person knows. The number P is according to the surveys between 1 and 6, where the latter number is the total consumer loans the institution is offering. Since this was an advertising campaign for one new product in addition the commercials included pictures, slogans etc about similar products. Thus via this variable way we can see if the campaign indeed informed people or not. One minor caveat that people were asked to answer this question with a number and were not checked whether they indeed know the products. As a consequence, there might be a measurement error but since this is an outcome variable, this will not affect the estimation of the effect. The estimated equation is:

$Log\ P_i = \alpha + \beta_1\ City\ A_i + \beta_2\ City\ B_i + \gamma T_i + \delta_1(City\ A_i * T_i) + \delta_1(City\ B_i * T_i) + [\theta_i\ characteristics] + \varepsilon_i$ where ε_i is the error term or in other words the variables which we do not observe.

In the above equation, $\boldsymbol{City\ A_i}$ and $\boldsymbol{City\ B_i}$ are dummy variables being one if the interviewed person is from that city or not;

$\boldsymbol{T_i}$ – is the timing variable being zero before the advertising campaign and one after it;

$\boldsymbol{\theta_i}$ – is a vector of characteristics on the individual level such as education, age, gender, monthly income etc.

Firstly I run the regression without the individual characteristics. In the model we expect that none of the individual features will have any significant effect on the awareness, $Log\ P_i$. By adding the individual characteristics we will be able to check the validity of our results by using the double difference estimator.

In order for the estimators to be trusted, following assumptions have to be met: a) the model specification is correct; b) $E[\varepsilon_i] = 0$, error term is zero on average; c) the covariance between the right-hand side variables and the error term are zero, meaning that: $Cov\ (City\ A_i$

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and $\varepsilon_i) = 0$, *Cov(City* B_i, $\varepsilon_i) = 0$, *Cov* (T_i ,$\varepsilon_i) = 0$ and *Cov (City* $A_i * T_i$, $\varepsilon_i) = Cov$(*City* $B_i * T_i$, $\varepsilon_i) = 0$.

Since the advertising campaign was set up as a controlled experiment, the researchers were able to control for all the meaningful variables and, most importantly, for those correlation with the unobserved terms which might bias the results. Thus, the timing was the same for all three cities, the duration of the advertising campaign was the same, the towns are located in three regions so we can safely assume that people did not travel from one city to another and were exposed only to one of the media and finally these cities are the biggest ones in Moldova and they share on average the same characteristics Hence the above assumptions under this framework hold.

According to this advertising campaign the results in terms of expectations will be the following:

$E[Y_0^C] = \alpha$

$E[Y_1^C] = \alpha + \gamma$

$E[Y_0^A] = \alpha + \beta_1$

$E[Y_1^A] = \alpha + \beta_1 + \gamma + \delta_1$

$E[Y_0^B] = \alpha + \beta_2$

$E[Y_1^B] = \alpha + \beta_2 + \gamma + \delta_2$, where Y_0 represents the outcome before the advertising campaign and Y_1 after the campaign, and the A,B,C are the indicators of the city where the campaign took place so for example Y_0^C – represents the outcome in city C before the campaign.

Under this model the diff-in-diff estimator will be the difference in average outcome of the people in city A before and after the advertising campaign minus the difference in average outcome of the people in city C before and after the campaign. The estimated value of δ_1 is unbiased by the following proof:

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Estimated $\delta_{1\,DD} = E[Y_1^A] - E[Y_0^A] - (E[Y_1^C] - E[Y_0^C])$

$= \alpha + \beta_1 + \gamma + \delta_1 - (\alpha + \beta_1) - (\alpha + \gamma - \alpha)$

$= \gamma + \delta_1 - \gamma$

$= \delta_1$

Applying the same reasoning, we can easily see that the estimated coefficient of $\delta_{2\,DD}$ is δ_2. The expected difference between cities A and B is by the same logic $\delta_1 - \delta_2$. Thus $\delta_{1,2}$ will capture the effect on people's awareness by using different media channels in an advertising campaign. The White Standard Errors will be further reported in parenthesis for determining the significance of an estimator, which are consistent under heteroscedasticity. The standard errors for the sum of coefficients will be computed from the covariance matrix given by the computer program.

The results for city A are summarized in the Table1: Example City A. For City B the results are presented in a similar manner.

Table 1: Example City A

	Before the campaign	After the campaign	Difference
City Treated	$\alpha + \beta_1$	$\alpha + \beta_1 + \gamma + \delta_1$	$\gamma + \delta_1$
City Control	α	$\alpha + \gamma$	γ
Difference	β_1	$\beta_1 + \delta_1$	δ_1

Finally, I use nearest neighbor matching, an alternative to regression to confirm the results obtained from the above model. Since the decision of which type of advertising to be transmitted in each city, was random and the people from those cities share similar features I can do the following: estimate the unobserved outcome of people from city A for example by looking at the average outcome of individuals with analogous characteristics from city C who were not exposed to the ads in city A. In other words, the matching procedure will estimate the unrealized outcome by finding other people in the dataset with similar characteristics but

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who were not exposed to the same media channel. Then the matching estimator will provide a number which will the sample's average treatment effect, by taking the difference between the outcomes in the treatment and control group. I will use the nearest neighbor matching with one-to-one number of matches.

I expect the matching estimator to be significant and have approximately the same value as the diff-in-diff estimator. If the numbers differ significantly, this means that the double difference estimator is biased and the model is inapplicable to the campaign evaluation of effectiveness. In other words, the treated and control groups might follow a different path in outcome, proving that the advertising campaign set up was non random.

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Chapter 5 - The main findings

The goal of the campaign was to find out which of the three media have the biggest impact on the consumers. This would help to understand whether an advertising campaign was effective or not and whether it transmitted the right message to the potential buyers. Since the choice of the media channels was not random, I expected that all of the traditional means have an impact on consumers. As for the advertising in city B before the campaign I expected that people in Moldova would not respond well to this type of advertising. The reasons behind this assumption were the following: firstly, people are mostly used to the standard ways of transmitting an advertising copy and could have ignored the new one; secondly financial products are usually advertised more formally, not in public transportation; and, finally, the success of this way of advertising depended on factors which I could not control such as the content of the messages and images. What I am interested in is to see whether there is a big difference among these channels.

Firstly I compare the results between city A and city C looking at the percentage change in number of products which consumers know.

Table 2: Diff-in-Diff Estimator, City C and A

	Before the campaign	After the campaign	Difference
City A	1.184 [0.341]***	1.327 [0.390]***	0.143 [0.042]***
City C	1.165 [0.036]***	1.278 [0.072]***	0.113 [0.031]***
Difference	0.019 [0.006]***	0.049 [0.012]***	0.030 [0.008]***

*** - 1% significance level; Number of obs. - 1500

Above figures indicate that there is a significant difference in the awareness of people before and after the campaign. In city C the awareness due to the advertising campaign grew on average by 11.3%. In this case 1.165 is not a precise number of the initial level of awareness but it is an indicator closely related to the baseline of awareness. That is why I

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focus on the percentage increase, which is the estimated figure of δ_1 from the model. In city A growth in the awareness was also registered. It has increased, *ceteris paribus* by 14.3% on average. Since these results are not surprising, as the media channels were chosen so they would yield the growth in awareness, we must compare the outcomes between the cities A and C. On average people who were exposed to advertising messages transmitted through TV commercials have a 3% higher awareness as compared to the people who were exposed to street hoardings.

Further we look at the differences between cities B and C:

Table 3. Matching Estimator cities C and B

	Before the campaign	After the campaign	Difference
City B	1.135 [0.287]***	1.298 [0.301]***	0.163 [0.037]***
City C	1.165 [0.036]***	1.278 [0.072]***	0.113 [0.031]***
Difference	-0.030 [0.008]***	0.020 [0.006]***	0.050 [0.014]***

*** - 1% significance level; Number of obs. - 1500

We can observe from Table 3 that the advertising campaign had a positive effect on awareness in City B, as well, this awareness has grown by 16.3%. Looking at the outcomes between cities we observe that on average people who were exposed to the advertising messages through the public transportation ads have a 5% higher awareness as compared to the people in city C. The effects of the campaign both within the cities and between them are significant at 1% level of significance. Due to the way this model was constructed we are able to compare the outcomes between cities B and A. We are interested in the difference between the percentage increases in awareness. By our model this is 2% higher in city B than city A.

One important thing has to be pointed out: values of the estimated β_1 and β_2 are not different from zero. This proves that there are permanent average differences in the number

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of products people know between the cities. In Moldova companies advertise to different extents depending on the city so it is not a surprise that beta coefficients are significant. A simple difference in the post-treatment outcomes between the cities would have yield biased results, particularly, overestimating the true effect of the campaign.

From the economic and company's point of view, these numbers are not very useful unless they are transposed into sales. However, since the advertising campaign has ended recently, there is no data for the number of products sold. However, I can use the next best data available – expected amount of sales, which is a number, based the opinion of the bank's experts and the company's history. In the past, one percentage increase in people's awareness was roughly equal to 1/5 increase in number of these products sold on average. Based on that the highest impact on sales is expected to happen in city B, where people where exposed to the advertising copies via public transportation hoardings and short slogans during each stop. Hence in city B sales are expected to increase by around 3.2%, in city A to increase by 2.8% and finally in City C to rise by 2.2%. Based on these estimations, it is possible to state that overall this campaign was successful. Moreover, in terms of effectiveness, the unconventional way of advertising had the highest impact on awareness.

The reason why this type of advertising had the biggest impact in comparison to the other two is probably due to the way it was transmitted. Ads were placed both inside and outside the vehicles. Therefore, unlike TV ads or street hoardings, they had basically no constraints in terms of a location and timing. In addition, small adverting played a very important role due to the fact that slogans were announced at each station which helped to memorize the other products as well. Another argument in favor of this type of advertising is the fact that none of the company's competitors had transmitted their messages in this fashion. It was a new way to deliver a message, not familiar to people, and it had a positive effect on memorizing what products are offered. By analyzing this adverting campaign I

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tested the hypothesis that unconventional ways of transmitting have high impact on the outcome variable, which in my research is awareness. These results are in line with the research carried out by Eastlack and Rao (1989) and prove that they do not depend either on industry or country's specific features.

My research confirms the result that one particular aspect of advertising, namely the informational ads, has a significant influence on customers (Ackerberg 2001, 2003). The goal of the advertising campaign was to inform the potential clients about the products the bank is offering. In terms of awareness, the campaign had significant impact which proves that it was effective and the usage of informational ads was indeed fruitful.

In addition, the analysis revealed one more important result, which seems to be the opposite of what Morgan and Stoltman (2002) found in their paper – informative TV advertising has indeed a great impact on awareness and can be considered as effective. The main argument why this is true for Moldova is most likely due to the fact that, unlike in the U.S., other types of media are not as widely used, and people still have more access to the television in comparison to any other source of news such as the internet or newspapers. This is one of country's specific characteristics, it will definitely fade away with the development of new media channels.

In order to double check the results, I ran the equation from the model additionally including all the individual characteristics such as age, education, income, whether a person works in the private or government sector etc. If the model is correct and the above result is indeed unbiased we expect that there should be no significant effect on awareness once we add these features in the equation. By analyzing the table from the appendix Table 6 we can see that none of the individual features have any significant impact on the outcome and the results remain unchanged. Therefore we can state that their estimated coefficients are not statistically significant from zero. This confirms that the diff-in-diff estimator was able to

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capture the effects of the advertising campaign which proved to be different from zero at 1% significance level.

Finally I will double check the results by using nearest neighbor matching which is an alternative way to estimate the results. Since I have three cities where the adverting campaign was transmitted differently, there are two control groups for every treated city. Computing the matching estimators in this case can be too cumbersome. That is why I divided the data into two subsamples where I match people from city C and city A on one hand, and people from city C and B on the other. Firstly I will assess the estimates from the first subsample:

Table 4. Matching Estimator cities C and A

```
. nnmatch LOG_P Ti Age Gender Educ Exper Private_Public Income Married Children Past_Loans Former_Client

Matching estimator:  Average Treatment Effect

Weighting matrix: inverse variance          Number of obs          =      1000
                                            Number of matches  (m) =         1

------------------------------------------------------------------------------
      LOG_P |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
       SATE |    .0297416  .0042738     6.96   0.000     .0211952    .0382871
------------------------------------------------------------------------------
Matching variables:  Age Gender Educ Exper Private_Public Income Married Children Past_Loans Former_Client
```

The matching estimator of the sample's average treatment effect is the same as the result obtained from regression. Therefore, as a result of the advertising campaign, all things being equal, in city A, on average, there is a 3% higher awareness then in city C at all significance levels.

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However we also have to look at the city's C and B below:

Table 5 Matching Estimator cities C and B

```
. nnmatch LOG_P Ti Age Gender Educ Exper Private_Public Income Married Children Past_Loans Former_Client

Matching estimator:  Average Treatment Effect

Weighting matrix: inverse variance          Number of obs          =      1000
                                            Number of matches  (m) =         1

------------------------------------------------------------------------------
       LOG_P |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        SATE |    .0501328  .0088573     5.66   0.000     .0324180    .0678475
------------------------------------------------------------------------------
Matching variables:  Age Gender Educ Exper Private_Public Income Married Children Past_Loans Former_Client
```

The matching estimator tell us that *ceteris paribus*, on average in city B there was a 5% higher awareness in comparison to city C after the advertising campaign. These are the exact same estimates which I got using the double difference estimation. This proves once again that the diff-in-diff estimator captured the effects of advertising and conclusion about this campaign can be safely inferred. Therefore I can safely state that there is no reason not to believe the results and the initial model for obtaining the diff-in-diff estimator is correct.

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Chapter 6 - Recommendations

The main purpose of any evaluation is to provide suggestions which can be applied in the future for further improvement. The assessment of the outcome of the campaign analyzed in this thesis makes it possible to formulate some recommendations which can be used at company level as well as at the government level.

On the micro I would recommend the management of any company to develop and use unconventional methods of advertising, for example through internet or mobile phones. The results confirm the ones from other studies (Eastlack and Rao 1989) proving that the effects of a campaign do not depend on a country or industry specific features in yielding the desired outcomes. The novelty and surprise factor implied by this type of advertising draws attention and enables people to be more aware of the company's product. This is especially important when a company wants to launch new products and potential customers' awareness is vital for future sales.

The research outlines the fact that when it comes to evaluating advertising campaign and the researchers face the lack of some crucial data, it is better to set up the campaign as a controlled experiment, which allows researchers to control for the variables they are interested in. In my research I was able to capture the effect of the campaign on people's awareness which I transposed into expected sales. This advice is in line with the conclusion drawn by Doyle and Fenwick (1975).

On the government level the findings from this research have greater applicability. Social campaigns which try to raise awareness such as against the dangers of drunk driving or the negative effects of smoking on non smokers need to be transmitted via channels which have the highest impact on people. Using unconventional methods of delivering such messages might be a better way of advertising compared to the traditional street hoardings and TV ads. Moreover, governments are not as concerned about the costs of advertising as

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the private companies. Hence my results can be used as a starting point in case any government faces the decision of which media channels to use in the promotion of a social campaign. Moreover, my findings have greater applicability for governments of countries which have similar characteristics as Moldova, such as being part of the USSR.

In the research I used matching as a tool to check if the results form the initial model were correct. The framework of the advertising campaign was designed in order to make sure that the assumption of the model would hold. However, in many cases these assumptions do not hold. A good example of this is when the outcome follows a dissimilar tendency in the treatment group in comparison to the control group. In other words *Cov (Dummy variable * T_i, ε_i)* is not equal to zero, which means that the double difference estimator is biased. In this case several options can be used to measure the result including nearest neighbor matching. Still, even for the matching estimator several assumption have to be met, which prove that even these alternative to regressions does not solve all problems. Moreover, the asymptotic proprieties of the matching estimator are not clearly defined in numerous cases (Wooldridge and Imbens 2009). Thus, I recommend the usage of exclusively the matching estimator in order to estimate the treatment effect only when all its assumptions are met and the program was not set up as a random experiment.

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Conclusion

In this research I demonstrated that two main statements: when data is missing the controlled experiment framework is the advisable way to design the research and the usage on unconventional media yields significant results which do not depend to industry characteristics. In the thesis I have implemented the existing theoretical concepts and methodology in order to analyze an advertising campaign of a Moldovan bank. My results reveal that the campaign had a significant impact on people's awareness which proves that the advertising campaign was effective. However, in my model several relevant variables are missing because of data unavailability, which allows for further research.

The most important variables which need to be added into the model are the cost of advertising and the amount of sales in the following months after the campaign. The amount of sales is very important because it can help us to come up with a ratio from the campaign between advertising awareness and number of products sold. This ratio can be further tested and compared to both company's past ratio and to the other similar findings in the economic literature. Moreover, coupled with the cost of advertising, the management of any company can decide which media channel to use, what type of advertising copies to transmit and whether to advertise or not at all.

In this research I did not take costs into account due to missing data; this is quite an unrealistic approach since price of transmitting a message is crucial in company's decision making.

For further research I would also check whether some advertising messages transmitted through different channels can yield the same or similar results in terms of awareness or impact on sales, but at a lower cost. I think that the result of this research would be very important for economists, because in this manner we can compare some specific

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characteristics both across countries and industries. In addition, this would represent an applicable finding for the any company or even the government.

Finally an extension, how to evaluate future advertising campaigns was suggested by the marketing experts in the bank. Besides awareness and its impact on sales, very useful questions for further research would be: what messages from an ad make people memorize the brand, do they understand the message, and, in the end, do they make the purchase. Moreover we can be analyze the probability of people memorizing something from the campaign such a number, a mascot, a song etc and associating it with a product brand or the company's name. Analyzing these variables will help to conclude if an advertising campaign was indeed successful or not.

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Appendix

Table 6. Results including the individual characteristics

Variable	Coefficient [White S.E.]
Constant	1.164 [0.033]***
City A	0.018 [0.006]***
City B	-0.028 [0.008]***
Ti	0.112 [0.030]***
City A* Ti	0.031 [0.008]***
City B* Ti	0.052 [0.014]***
Age	-0.015 [0.021]
Gender	-0.009 [0. 008]
Educ	0.025 [0.022]
Exper	0.004 [0.003]
Private_Public	-0.039 [0.036]
Income	0.010 [0.008]
Married	0.005 [0.008]
Children	0.025 [0.036]
Past_Loans	0.201 [1.368]
Former_Client	0.006 [0.009]

*** - 1% significance level; Number of obs. – 1500

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