Senior Project

Department of Economics

Effect of Membership Programs on Individual Giving

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Abstract

Non-profit organizations (NPOs) are directly tied to the well-being of the local, state, and national economies they reside in, and the operational support of these organizations heavily depends on individual giving. As a strategy to cultivate individual donors, some non-profits utilize membership programs with added benefits as a method of fostering loyalty to their organization and incentivizing giving behavior. However, research is limited regarding what effect membership programs have on the amounts people are willing to give. In this paper, I collect and analyze donation data from an arts-and-culture based non-profit that launched their first membership program in November 2021. To determine the effect a membership program has on total year-end gifts received by an art-and-culture based non-profit organization, I apply the two-way fixed effect difference-in-difference method. The testing found that an individual who signs up for the membership program decreases their donation level by $163.07 on average compared to those who did not sign up. The findings presented inform non-profit development strategists on what methods are most beneficial to pursue for their organization and adds to the literature on motivations for donating and effect of prioritization strategies.

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I.   Introduction

Non-profit organizations (NPOs) are directly tied to the well-being of the local, state, and national economies by creating jobs within the organization and the companies they interact with and spurring economic activity for local businesses (Economic Impact, 2020). In 2016, the nonprofit sector contributed an estimated 5.6% of gross domestic product (NCCS Project Team, 2020). During the year prior, arts-and-culture-based nonprofits specifically generated $27.5 billion in revenue for local, state, and federal governments and supported 4.6 million employees (Americans For the Arts, 2015). To sustain these levels of economic activity, nonprofits depend on donations from government grants, corporations, bequests, and heavily from individuals, which make up 75% of nonprofits' total gifts received as their most reliable source of operational support (List, 2011). Given the influence nonprofits have on the economy, along with how dependent they are on individual donors, studies involving donor relations are necessary.

In response to growing competition for donor's dollars (List, 2011; Farkas et al., 2020), some NPOs adopt a membership program strategy which exchanges a charitable donation for a set of benefits. The renewable nature of memberships moves nonprofits that utilize this tactic towards a source of reliable revenue. Membership programs additionally provide a channel for information exchange that closes the gap between donors and the organization. In doing so, the organization can learn more about the values and motivations of the donor (Farkas et al., 2020) for the sake of maintaining a long, healthy relationship and increasing the potential for large, planned gifts to the organization.

Understanding that membership programs function as both a source of fundraising and strengthening donor relations (Farkas et al., 2020), I determine the effect membership programs

have on the total individual[1] giving amounts received by a nonprofit. The Akron Civic Theatre launched its first membership program in 2021 and will be the example used to investigate membership effect. Determining the effect of such a development strategy will contribute to nonprofit knowledge by more thoroughly quantifying the total return on investment in resources and time that membership programs require and providing an area of discussion on philanthropic motivation.

The rest of the paper is organized as follows. Section 2 provides background on membership programs. Section 3 describes the data. Section 4 discloses philanthropic motivational theory. Section 5 explains empirical methodology. Section 6 reports the results. Section 7 concludes.

II.   Literature Review

Membership programs are a unique development strategy for NPOs, because they offer additional benefit to donations without anything in return, making them more akin to for-profit organization loyalty programs. There is a scarcity of direct theories and empirical research on how membership programs affect charitable donations. The current literature on membership or loyalty programs covers those applied to for-profit organizations. The evidence of loyalty programs' effectiveness in the for-profit sector reasonably supports that similar customer retention programs have a positive effect in the not-for-profit sector (Minguez & Javier Sese, 2022). The Minguez and Javier Sese (2022) study revealed what kind of donors are more likely to consent to receiving marketing communications. Membership programs are more complex in that they include more than just marketing communications when engaging donors and are

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[1] I specify using the word "individual", because the donor base I gathered from also includes corporations and foundations. For this analysis, I am focused on individual giving.

arguably a better form of opening communication. The information exchange cultivated within membership programs allows companies and organizations to learn more about the values and motivations of the customer or donor, to better serve their needs and establish loyal commitment to the brand or cause. For nonprofits specifically, the information exchange provides a source to identify the best prospects for bequests, which require alignment of beliefs between the donor and organization.

An individual's loyalty to an organization is a significant factor to increasing the likelihood they are willing to give by building the trust they have in the organization (Boenigk & Helmig, 2013). Trust that the organization will use the donation in a productive manner is an important incentive for large donations combined with a nonprofit's professionalization of transparency and accountability. Both are essential elements that motivate donors to make large bequests (Sargeant, Wymer, & Hilton, 2006), which importantly make up 6.5% of total giving (List, 2011). While trust does foster commitment to an organization, it will not be as potent for incentivizing gift-giving as the extent an individual's beliefs align with that of the nonprofit's (Sargeant & Woodlife, 2007). Membership programs help identify those individuals more likely to make a planned gift in the future, allowing the organization to focus its resources on the more engaged and interested donors. The literature supports how fostering trust and loyalty with donors benefit nonprofits in the long term; however, it does not contain clear examples of how fostering loyalty effects short term support.

Among nonprofit membership program research, the closest analysis reveals the effect of prioritization strategy on relationship factors of fundraising, including donor satisfaction, loyalty, volunteer activity, and upgrade or downgrade intentions in German nonprofits (Boenigk &

Helmig, 2013). Boenigk and Helmig (2013) reveal that the motivation to give at higher donation levels differs from those of lower levels, and by having "rules" or levels of inclusions or exclusion to a segment the organization fosters greater loyalty. They find that cultural organizations with a prioritization strategy outperform organizations treat their donors equally. Communication by the organization that utilizes specific donation amount requests incentivizes an increase in a donor's propensity to give (Yörük, 2009). Membership programs capitalize on this strategy by providing donors with a set of giving levels to choose from.

The drawback of membership programs compared to donation solicitation is the cost of included benefits because many donors are willing to give without the added incentive (Granik, 2005). Charities function most efficiently when they limit their contact to individuals with a higher chance of giving more than it costs to acquire them as donors (Correa, 2013). By analyzing the effect of memberships on individual giving levels, my research expands on the results presented by Boenigk and Helmig (2013) by quantifying the monetary effect of a prioritization strategy, building upon their qualitative results. Nonprofits can use the results for reference when determining whether or not a membership program is an effective development and fundraising strategy to invest in.

III.   Data Overview

In November 2021, the Akron Civic Theatre, an arts-and-culture based nonprofit, launched its first membership program. The membership program offers benefits packages for donations ranging between $150-$5,000. Data to perform the analysis is gathered directly from the donor base management system of the nonprofit. The raw sample consists of 859 individual donors who have given anytime between January 1, 2016 and December 31, 2022, and it is

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further divided between those who adopted the membership program after its initiation

(Treatment group) and those who did not (Control Group). Because the analysis involves

comparison before and after the program's initiation date, I removed accounts who have only

made one transaction within the time frame and those who have only given to the membership

program. The result is a sample of 450 accounts, 106 of which signed up for membership.

Additionally, because the treatment took effect on November 1, 2021, I renamed the

yearly cycle such that the start of the year is November 1, and the end of the year is October 31.

Using the received amounts and dates, I calculated yearly totals, along with quarterly data to

determine if the program influenced both yearly and quarter donation levels and to evaluate the

difference in effect for both time periods. The yearly total observations from 2017-2022 result in

a sample of 2700, which includes $0 values for the years an individual did not give. Figure 1

presents my self-defined year-end total donations received for the Treatment and Control groups.

It is also important to note that the organization underwent a significant Capital Campaign that

increased donation levels between the years of 2018-2020, which is shown in Figure 1.

Figure 1. Year-End Total Gifts Received by the organization from 2016 – 2022 in US Dollars.
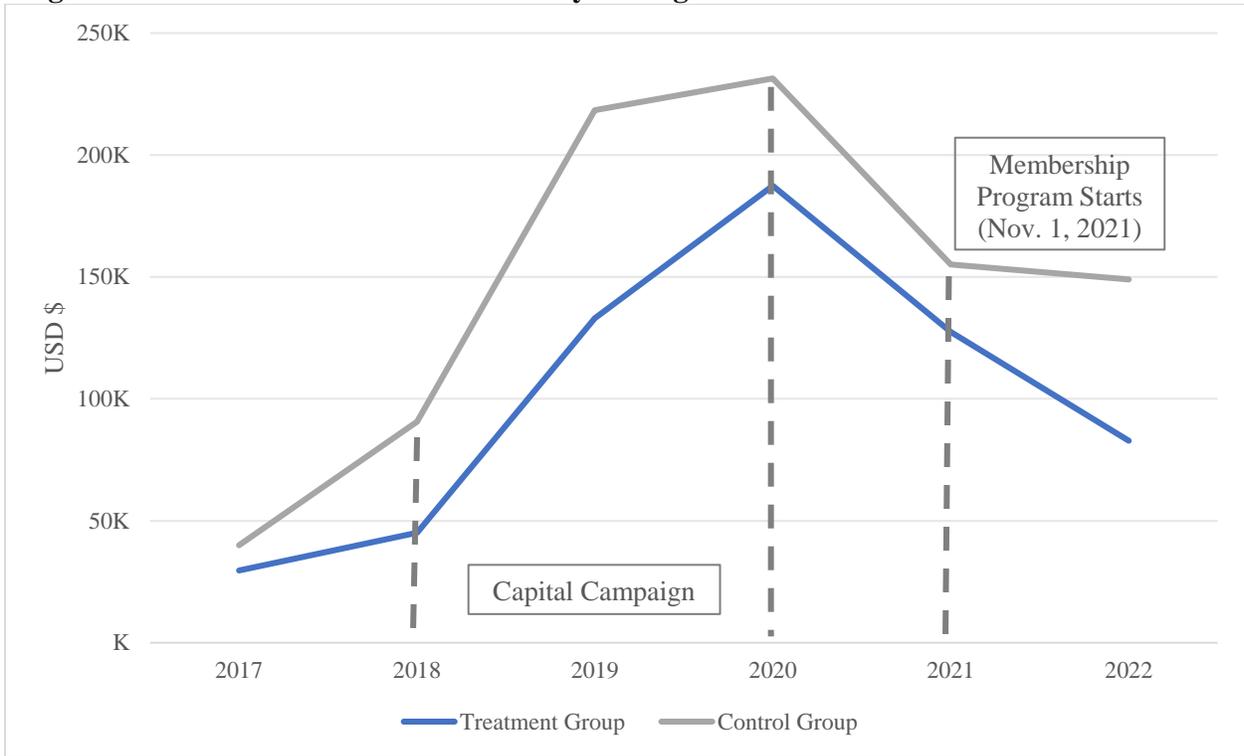
Source: Akron Civic Theatre (2023) and own calculations.
Notes: The Treatment Group consists of donors who have given prior to when the Membership Program started and subsequently signed up for the membership program when it was offered. The Control Group contains donors who have given before and after the Membership Program started but did not sign up for the program. The organization underwent a Capital Campaign between 2018-2020, significantly increasing donation levels in that time frame. Years are redefined according to the membership program start date, meaning November marks 1/12 and October would be 12/12. Donations used to create the chart an in US dollars and do include the value of membership payments post-2021, because they are a form of donation.

Lastly, the dataset includes Propensity, Capacity, and Affinity control variables, which are indication of the donor's Propensity to give to nonprofits, their Capacity to give (their wealth level), and their Affinity to give to this specific type of nonprofit (affinity for art-and-culture based nonprofits). The variables are on a scale of 1-4, 4 being high level for that category and 1 being low level. These levels were calculated using a system that accounts for the nonprofit's transaction history with the donor in combination with how the donor has interacted with other

nonprofits based on references from publicly available reports[2]. Table 1 lists the average values and summary statistics for these three categories, the Control and Treatment groups, the Control group post-treatment, as well as for the total donations of the sample in US dollars. The average levels of Propensity, Affinity, and Capacity are informative of the organization's donor base. The average yearly donation amounts across the sample and for the Control group during the post-treatment period will be used to determine the significance of the end results of the analysis.

Table 1. Summary Statistics

Variable	N	MIN	MAX	MEAN	STD
Propensity	450	1	4	3	1.3457
Affinity	450	1	4	2	1.1617
Capacity	450	1	4	1	0.8642
Control	2052	0	50000	374	2491.2463
Control Post-Treatment	342	0	50000	477	2862.3390
Treatment	648	0	55000	903	4302.9295
Total Sample	2700	0	55000	501	3034.0933

Source: Akron Civic Theatre (2023) and own calculations.
Notes: Propensity, Affinity and capacity are ordinal variables with a value between 1 and 4 that indicates the likelihood a donor is going to give to an organization based on the category, 4 being high level and 1 being low level. Propensity indicates how much an individual to gives to nonprofits. Capacity indicates a donor's level of wealth. Affinity indicates how likely an individual is going to give to this type of organization; in this analysis the organization is arts-and-culture based. Control and Treatment statistics are provided for each group separately. Total Sample represents the total sample of donations. Donations used to create the chart are in US dollars and do include the value of membership payments post-2021, because they are a form of donation.

IV.   Theoretical Framework

Economists divide the theory behind giving motivation between whether the benefits of donating can be construed as a public or private good. Public goods function under the assumption the benefit of the good is distributed equally. Under the public good assumption, nonprofits may experience the free-rider effect of individuals who will not donate since they are

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[2] iWave is the 2nd party system that calculated the levels for Propensity, Affinity, and Capacity. Using most recent gift date and the amount and lifetime received totals from Akron Civic Theatre interaction with the donor in combination with publicly available report data, iWave calculated the levels used in this analysis.

receiving the same benefit by another individual's donation at no cost to them, reducing the total amounts a nonprofit receives. Private goods, however, offer varying benefits according to the value each individual assigns to the product or service. Vesterlund (2006), explains that the benefit of philanthropy has an average tendency of being private in nature, suggesting that charitable donations are not motivated by the end-result, rather the personal benefit one reaps from the act. Assuming that donations are private in nature allows me to focus on the individual's motivation for giving and how the membership program affects their decision, without concern of the effects that public goods face.

Theories behind personal benefit motivations are either intrinsic or extrinsic. Some extrinsic theories claim that giving is motivated by the happiness of others, the achievement of a general goal, or the utilitarian benefit of the group the donation goes towards (Rose-Ackerman, 1996; Andreoni, 2006). While some donors that sign up as members may be doing so because they know their donation will be put to a good cause, this can be applied to any donor, regardless of membership status. However, intrinsic theories, such as the well-known "warm-glow" theory named by Andreoni (1989), state that value is derived from the act of giving separate from the outcome provide for others. In "warm-glow" theory, an individual donates because they obtain internal "feel good" benefit from the action. Another example behind intrinsic theories is when some individuals donate to detonate their economic status or to avoid negative judgement from their community (Vesterlund, 2006). Essentially, these theories support buy-in mentality in which the donor feels good about donating, because they receive something directly for it whereas extrinsically motivated donors received indirect benefit because they contributed to something outside themselves.

Membership donation strategies are unique in that the motivation for giving to them can be categorized between intrinsic and extrinsic forms. On the side of extrinsic theory, donors feel good that by buying a membership, they are contributing to the organization. However, the benefits received through signing up with membership programs, much like purchasing any other private good, align more so with intrinsic motivational theory, because said benefits are only available to the individual. Based on these motivations, I expect the individual donors who sign up for the membership's incentivizing additional benefits—apart from philanthropic benefits— will increase the total yearly donations received. Analyzing the effect membership style prioritization strategies have on the direct monetary benefit an organization receives adds to literature in support of intrinsic charitable giving theory.

V.   Methodology

I determine the effect a membership program has on individual giving received using the difference-in-difference method, which compares the changes in donation levels between donors who have signed up for membership program and those who have not before and after the program started in 2021. My simple difference-in-difference model equations are as follows:

$$Yamount_{AY} = B_0 + B_1 DID_{AY} + After_y + Member_A + \varepsilon_{AY} \quad (1)$$

$$Yamount_{AY} = B_0 + B_1 DID_{AY} + After_y + Member_A + Control_A + \varepsilon_{AY} \quad (2)$$

$Yamount_{AY}$ represents the outcome variable individual year-end donations received in USD for each donor account A in year Y. The treatment group variable, $Member_{AY}$, is equal to 1 if the donor account A signed up for the membership and 0 otherwise. $After_{AY}$ is an indicator variable equal to 1 if year is greater than 2021 and 0 otherwise. DID_{AY} is an interaction term between $After_{AY}$ and $Member_{AY}$, being equal to 1 if the observation belongs to a donor that

signed up for the membership program and is in a year greater than 2021. $Control_A$ represents my control variables that account for the likelihood that an individual is signing up for the membership program compared to others using their propensity to donate to nonprofits, their capacity to donate, and affinity to donating to art-and-culture-based nonprofits. Control Variables are included in Model 2 but excluded from Model 1. Finally, my third model is a two-way fixed effects difference-in-difference model. The equation for Model 3 is as follows:

$$Yamount_{AY} = B_0 + B_1 DID_{AY} + Year_{AY} + Account_{AY} + \varepsilon_{AY} \quad (3)$$

$Year_{AY}$ is the year of the observation and accounts for any variation's year-to-year. $Account_{AY}$ accounts for the donor fixed effects. The definition of DID_{AY} does not change. For all models, B_1, the coefficient of interest, is interpreted as the mean effect the membership program has on individual donation levels relative to those who did not sign up for the membership program after its initiation.

The difference-in-difference method requires that the treatment effect be constant across time and constituents. Since it is not possible to test if these are constant directly, we can assume that the effect is constant given that the treatment and control groups act the same had the treatment never taken place. To test if treatment and control groups act the same, I ran a balance of regressors test and parallel trends test. The result of the balance of regressors test are found in Table 2.

Table 2. Balance of Regressors Test

Variable	Control	Treatment	Difference
Affinity	1.75	1.83	-0.08
Capacity	1.44	1.46	-0.02
Propensity	2.87	3.13	-0.26*

Source: Akron Civic Theatre (2023) and own calculations.
Notes: The table shows the pre-2021 average value of regressors for the treatment and control groups as well as their difference. Differences that are statistically significant are identified with *, **, and *** corresponding to 10%, 5%, and 1% significance levels, respectively. The Difference between Control and Treatment means show that both groups are statistically similar prior to 2021, apart from Propensity which indicates a difference between the two groups.

Because the mean values of the model's control variables are statistically similar across the samples prior to 2021 when the treatment took place, the test supports that both groups behave similarly prior to treatment. However, the mean value for Propensity does differ between both groups; therefore, the added support of a parallel trends test result is necessary. For the parallel trend test, Figure 1 in the Data Overview section graphically indicates that the treatment and control groups do behave similarly prior to the program's start date. In addition to this visual test, the results of the statistical analysis support that the groups do have a parallel trend prior to treatment.

Table 3. Parallel Trends Test

Regressors	Model1	Model2
Intercept	-117.21	-1135.42***
	(284.96)	(331.19)
Member	445.95	414.58
	(1231.52)	(1231.66)
Year	180.84	180.84
	(400.06)	(400.78)
Year^2	13.00	13.00
	(149.11)	(148.65)
Year^3	-4.61	-4.61
	(15.52)	(15.44)

Regressors	Model1	Model2
Member*Year	-488.26	-488.26
	(1583.77)	(1571.70)
Member*Year^2	277.45	277.45
	(533.17)	(525.90)
Member*Year^3	-32.87	-32.87
	(51.33)	(50.41)
Control Variables Included?	No	Yes

Source: Akron Civic Theatre (2023) and own calculations.
Notes: The table shows the average pre-2021 value of regressors. Model2 includes control variables whereas Model1 does not. Differences that are statistically significant are identified with *, **, and *** corresponding to 10%, 5%, and 1% significance levels, respectively. In both models, the interaction between Member (the treatment) and Year is statistically the same as zero, therefore we can conclude that a parallel trend exists.

Because the two groups move similarly prior to treatment, I can conclude that they would continue to move similarly had the treatment never taken place. The combined results from the parallel trend and balance of regressors tests indicate that I can lay causal claim to my statistically determined coefficients which describe the true effect membership programs have on yearly individual giving levels.

VI.   Results

The main results of the analysis are present in Table 3. Model1 is derived from the baseline, simple Difference-in-Difference formula described in Methodology. Model2 expands on Model1 by adding control variables. Model3 presents the two-way fixed effect method, by fixing year and account effects.

Table 3. Membership Effect on Gifts Received

Regressors	Model1	Model2	Model3
DID	-163.07	-163.07	-163.07
	(306.08)	(294.70)	(303.83)
Member	556.09***	524.72**	
	(208.55)	(203.67)	
After	123.72	123.72	
	(165.30)	(163.53)	
Intercept	353.55***	-664.66***	209.44
	(58.32)	(184.21)	(166.20)
Control Variables Included?	No	Yes	No
Account Fixed Effects	No	No	Yes
Year Fixed Effects	No	No	Yes
Number of Observation	2700	2700	2700
Adjusted R-Square	0.00462	0.0296	0.2772
Overall Significance	4.92***	8.27***	2.37***

Source: Akron Civic Theatre (2023) and own calculations.
Notes: Model1 is a simple difference-in-difference model, and Model2 adds Capacity, Affinity, and Propensity as control variables to Model1. Model3 is a two-way fixed effects difference in difference. Robust standard errors are in parentheses. *, **, *** indicate 10%, 5%, and 1% significance levels respectively.

According to the models, becoming a member decreases the total year-end received amount by \$163.07 on average compared to what they would have donated not being a member. Noting that the average gift amount of the samples was \$501, the \$163 amount is a significant difference. Relatively, memberships resulted in a 34% reduction in donations compared to what the yearly donation level would have been had the organization never launched the program[3]. The result remains the same across the simple model and two-way fixed effect model.

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[3] 34% is calculated by dividing the DID coefficient, -163.06 by the average donation level for the control group post-treatment, shown in Table 1, Section 3.

VII.   Conclusion

By analyzing donation level behavior across donors of the Akron Civic Theatre and years using the difference-in-difference method, I have determined an estimate of what effect membership programs have on nonprofits' yearly donations received. Donors who sign up for the membership program decrease their donation level by $163.07 compared to those who do not sign up. As such, the negative effect did not align with the hypothesis I proposed within the theory section. These results indicate that nonprofits who utilize a benefit incentivized prioritization strategy are losing money in the short-term. They also offer an argument against intrinsic motivational theories of giving in favor of extrinsic motivations. A plausible reason for these results is that during the first year of membership solicitation, those that were not interested in adopting the membership appreciated the offer enough to philanthropically donate as a means of respectfully declining the offer. Donors seem to substitute giving through the membership program in favor of philanthropic donations.

For development strategists, enacting a membership program will have lower return than strategies without additional benefits. These benefits add a layer of costs to the low return; therefore, it is necessary for nonprofits to clarify their short-term and long-term goals of membership programs before enacting them. In the broadest sense, support for the argument that individuals do not donate for their personal benefit, but favor donating to the benefit of the organization, is a critical conclusion for nonprofit development leaders. It will shape the way they foster donations to increase the operational funding the organization receives and better the communities these nonprofits support.

The results imply that nonprofits should not utilize membership programs if they aim to increase people's willingness to donate. However, further research should investigate the long-term effect of membership programs to determine if this type of relationship-building strategy is a worthwhile cost to foster large scale gifts at the end of a donor's life or in times of high need for the organization. Membership programs could be a worthwhile investment if engaging with the program increases a donor's willingness to make bequests in the future, which would positively exceed the upfront costs of engaging them as a member. Additionally, my results are based on one type of nonprofit. Further research into whether the effect remains the same across the various community's nonprofit's support would make these investigations more widely applicable. Finally, having more post-treatment data will likely change the results and increase accuracy. As such, I recommend a similar test be run once more years of data become available.

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Appendix 1: SAS Codes

```
libname Donors "/home/u60152426/MySAS";

data donordata;
set donors.donordata;
Yearsq=Year*Year;
Yearcb=Year*Year*Year;
if Year>2021 then After=1;
else After=0;
DID=After*Member;
run;


/*Descriptive Statistics*/

data Yamount1;
      set donordata;
      keep Yamount;
      rename Yamount=Treatment;
      where Member=1;
      length Variable $15;
run;
proc means data=Yamount1 missing noprint;
   output out=myout1(drop= _type_ _freq_);
run;
proc print data=myout1 noobs;
   title 'Default Data set 1';
run;
proc transpose data=myout1 out=mytransp1 (drop=_label_) name=Variable;
   id _stat_;
run;

data Yamount0;
      set donordata;
      keep Yamount;
      rename Yamount=Control;
      where Member=0;
      length Variable $15;
run;
proc means data=Yamount0 missing noprint;
   output out=myout0(drop= _type_ _freq_);
run;
proc print data=myout0 noobs;
   title 'Default Data set 0';
run;
proc transpose data=myout0 out=mytransp0 (drop=_label_) name=Variable;
   id _stat_;
run;

data Yamount0c;
```

```
        set donordata;
        keep Yamount;
        rename Yamount=ControlPostTreatment;
        where Member=0 and Year=2022;
        length Variable $15;
run;
proc means data=Yamount0c missing noprint;
    output out=myout0c(drop= _type_ _freq_);
run;
proc print data=myout0c noobs;
    title 'Default Data set 0c';
run;
proc transpose data=myout0c out=mytransp0c (drop=_label_)
name=Variable;
    id _stat_;
run;


data Yamount;
        set donordata;
        keep Yamount;
        rename Yamount=Total;
        length Variable $15;
run;
proc means data=Yamount missing noprint;
    output out=myouttot(drop= _type_ _freq_);
run;
proc print data=myouttot noobs;
    title 'Default Data set';
run;
proc transpose data=myouttot out=mytransptot (drop=_label_)
name=Variable;
    id _stat_;
run;

data ProAffCap;
        set donordata;
        keep Propensity Affinity Capacity;
        where Year=2022;
        length Variable $15;
run;
proc means data=ProAffCap missing noprint;
    output out=myoutPAC(drop= _type_ _freq_);
run;
proc print data=myoutPAC noobs;
    title 'Default Data set PAC';
run;
proc transpose data=myoutPAC out=mytranspPAC (drop=_label_)
name=Variable;
    id _stat_;
```

```
run;

data mytransp;
set mytranspPAC mytransp0 mytransp0c mytransp1 mytransptot;
run;


ods excel file="/home/u60152426/MySAS/SumStats.xlsx"
options(Embedded_Titles="ON" Embedded_Footnotes="ON");
title 'Table 1. Summary Statistics'
footnote justify=left "Source: Akron Civic Theatre (2023) and own
calculations.
Notes: Propensity, Affinity and capacity are ordinal variables with a
value between 1 and 4 that indicates the likelihood a donor is going
to give to an organization based on the category, 4 being high level
and 1 being low level.
Propensity indicates how much an individual to gives to nonprofits.
Capacity indicates a donor's level of wealth. Affinity indicates how
likely an individual is going to give to this type of organization; in
this analysis the organization is arts-and-culture based.
Total Sample represents the total sample of donations. Donations used
to create the chart an in US dollars and do include the value of
membership payments post-2021, because they are a form of donation.
";
proc print data=mytransp noobs;
    title 'Summary Statistics';
    format Mean Min Max 10.0;
    format STD 10.4;
run;
ods excel close;

/*Balance of Regressors Test*/

ods output Conflimits=MeanVals ttests=PValue;
Proc TTest Data = donordata;
Where Year=2021; /*No Membership program pre-2022*/
Var Propensity Capacity Affinity;
Class Member; /*Member =1 if a donor has signed up for the membership
program; zero otherwise */
Run;
quit;

proc sort data=MeanVals;
by Variable Method;
run;
proc sort data=Pvalue;
by Variable Method;
run;

data MergedResults;
    merge MeanVals PValue;
```

```
      by Variable Method;
      keep Mean Variable EditedMean Class;
      length Star $3;
      where method ne "Pooled";

      If Probt=. then
            Star="";
      else if Probt le 0.01 then
            Star="***";
      else if Probt le 0.05 then
            Star="**";
      else if Probt le 0.1 then
            Star="*";
      else
            Star="";
      EditedMean=Cats(put(Mean, 10.2), Star);
      length Class $30;

      if Class=1 then
            Class="Treatment";
      else if Class=0 then
            Class="Control";
      else
            Class="Difference";
run;


Proc Print Data=MergedResults;
run;

proc transpose data=MergedResults out=TTestResults;
      Var EditedMean;
      by Variable;
      id Class;
Run;

data TTestResults1;
set TTestResults;
drop _NAME_;
run;

Title "Table 2. Balance of Regressors Test";
footnote justify=left "Source: Akron Civic Theatre (2023) and own
calculations. Notes: The table shows the pre-2021 average value of
regressors for the treatment and control groups as well as their
difference.
Differences that are statistically significant are identified with *,
**, and *** corresponding to 10%, 5%, and 1% significance levels,
respectively.
 ";
proc print data=TTestResults1 noobs;
```

```
run;


/*Parallel Trend Test*/

data YearAdjust;
set donordata;
if Year=2017 then YearN=1;
if  Year=2018 then YearN=2;
if Year=2019 then YearN=3;
if  Year=2020 then YearN=4;
if Year=2021 then YearN=5;
if Year=2022 then YearN=6;
YearsqN=YearN*YearN;
YearcbN=YearN*YearN*YearN;
run;


ods output ParameterEstimates=PE1;
Proc Surveyreg data=YearAdjust;
Model Yamount=Member YearN YearsqN YearcbN Member*YearN Member*YearsqN
Member*YearcbN /solution adjrsq;
run;
quit;


ods output ParameterEstimates=PE2;
Proc Surveyreg data=YearAdjust;
Model Yamount=Member YearN YearsqN YearcbN Member*YearN Member*YearsqN
Member*YearcbN Capacity Propensity Affinity/solution adjrsq;
run;
quit;


data ParallelTrend;
      set PE1 PE2 indsname=M;

      if M="WORK.PE1" then Model="Model1";
          else Model="Model2";
      keep Parameter Model EditedResult;
      length Star $3;

      If Probt=. then
          Star="";
      else if Probt le 0.01 then
          Star="***";
      else if Probt le 0.05 then
          Star="**";
      else if Probt le 0.1 then
          Star="*";
      else
          Star="";
      EditedResult=Cats(put(Estimate, 10.2), Star);
```

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```
      output;
      EditedResult=Cats("(",put(StdErr,10.2),")");
      output;
run;


proc print data=ParallelTrend;
run;


Proc sort data=ParallelTrend out=ParallelTrend2;
      by Parameter;
run;


Data Model1Results(rename=(EditedResult=Model1))
       Model2Results(rename=(EditedResult=Model2));
       set ParallelTrend2;

       if Model="Model1" then output Model1Results;
            else output Model2Results;
            drop Model;
run;


data MergedResults;
      merge Model1Results Model2Results;
      by Parameter;

      if mod(_n_,2)=1 then Variable=Parameter;
      if Parameter="Intercept" then Order=1;
            else if Parameter="Member" then Order=2;
            else if substr(Parameter,1,5)="YearN" then Order=3;
            else if substr(Parameter,1,7)="YearsqN" then Order=4;
            else if substr(Parameter,1,7)="YearcbN" then Order=5;
            else if substr(Parameter,1,12)="Member*YearN" then Order=6;
            else if substr(Parameter,1,14)="Member*YearsqN" then
Order=7;
            else if substr(Parameter,1,14)="Member*YearcbN" then
Order=8;
            else Order=9;
run;


Proc sort data=MergedResults out=MergedResults_sorted;
      by Order;
run;


Proc format;
      value $VariableFormat(default=50)
      YearN=Year YearsqN=Year^2 YearcbN=Year^3
      'Member*YearN'=Member*Year  'Member*YearsqN'=Member*Year^2
'Member*YearcbN'=Member*Year^3;
run;
```

```
title "Table 3. Parallel Trends Test";
proc print data=MergedResults_sorted noobs;
      var Variable Model1-Model2;
      format Variable $VariableFormat.;
      footnote justify=left "Source: Akron Civic Theatre (2023) and own
calculations. Notes: The table shows the average pre-2021 value of
regressors. Model2 includes control variables whereas Model1 does not.
Differences that are statistically significant are identified with *,
**, and *** corresponding to 10%, 5%, and 1% significance levels,
respectively. In both models, the interaction between Member (the
treatment) and Year is statistically the same as zero, therfore we can
conclude that a parellel trend exists.
 ";
run;



/*Difference-in-Difference Analysis*/

/*Simple DID Model*/
ods output ParameterEstimates=PE3 datasummary=Obsmodel3
                  fitstatistics=AdjRsqModel3 effects=OverallsigModel3;
proc SurveyReg data=donordata;
      Model  Yamount= DID Member After /solution adjrsq;
run;
quit;
/*Simple DID with Control Model*/
ods output ParameterEstimates=PE4 datasummary=Obsmodel4
                  fitstatistics=AdjRsqModel4 effects=OverallsigModel4;
proc SurveyReg data=donordata;
      /*class Account Year;*/
      Model  Yamount= DID Member After Propensity Capacity Affinity
/solution adjrsq;
run;
quit;
/*Two way fixed effects DID Model*/
ods output ParameterEstimates=PE5 datasummary=Obsmodel5
                  fitstatistics=AdjRsqModel5 effects=OverallsigModel5;
proc SurveyReg data=donordata;
      class Account Year;
      Model  Yamount= DID Year Account /solution adjrsq;
run;
quit;

proc sort data=donordata;
by DID;
Run;
proc means data=donordata;
var Yamount;
where Year=2022 and Yamount>0;
```

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```
by DID;
run;

data donordata2;
      set PE3 PE4 PE5 indsname=M;

      if M="WORK.PE3" then Model="DIDModel1";
            else if M="WORK.PE4" then Model="DIDModel2";
            else Model="DIDModel3";

      if Probt le 0.01 then Star="***";
            else if Probt le 0.05 then Star="**";
            else if Probt le 0.1 then Star="*";
            else Star="";

      Results=Estimate;
      EditedResults=cats(put(Results,20.2),Star);
      output;

      Star="";
      Results=StdErr;
      EditedResults=cats("(",put(Results,20.2),")");
      output;

      keep Parameter Model EditedResults;
      where StdErr ne 0;
run;

data  donordata3;
      set donordata2;
      if mod(_n_,2)=1 then Regressors=Parameter;

      length Order 3;
      if Parameter= "Intercept" then Order=1;
            else if substr(Parameter,1,6)="Member" then Order=3;
            else if substr(Parameter,1,5)="After" then Order=4;
            else if substr(Parameter,1,3)="DID" then Order=2;
            else if substr(Parameter,1,8)="Capacity" then Order=5;
            else if substr(Parameter,1,8)="Affinity" then Order=6;
            else if substr(Parameter,1,10)="Propensity" then Order=7;
            else if substr(Parameter,1,4)="Year" then Order=8;
            else Order=9;
run;

data DIDModel1Results (rename=(EditedResults=Model1))
            DIDModel2Results (rename=(EditedResults=Model2))
            DIDModel3Results (rename=(EditedResults=Model3));
      set donordata3;
      if Model="DIDModel1" then output DIDModel1Results;
            else if Model="DIDModel2" then output DIDModel2Results;
```

```
                else output DIDModel3Results;
run;


data CompleteTable;
      merge Model1 Model2 Model3;
run;


data NumofObs (keep=Label1 Model1 Model2 Model3);
      merge ObsModel3(rename=(nvalue1=NVDIDModel1))
ObsModel4(rename=(nvalue1=NVDIDModel2))
ObsModel4(rename=(nvalue1=NVDIDModel3));
      by Label1;
      where Label1="Number of Observations";
      Model1=put(NVDIDModel1,comma16.0);
      Model2=put(NVDIDModel2,comma16.0);
      Model3=put(NVDIDModel3,comma16.0);
run;


data AdjRsq (keep=Label1 Model1 Model2 Model3);
      merge AdjRsqModel3(rename=(cvalue1=Model1))
AdjRsqModel4(rename=(cvalue1=Model2))
AdjRsqModel5(rename=(cvalue1=Model3));
      where Label1="Adjusted R-Square";
run;


data OSM1(rename=(EditedValue=Model1))
OSM2(rename=(EditedValue=Model2)) OSM3(rename=(EditedValue=Model3));
      set OverallsigModel3 OverallsigModel4 OverallsigModel5
indsname=M;
      where Effect="Model";
      Label1="Overall Significance";
      if Probf le 0.01 then Star="***";
            else if Probf le 0.05 then Star="**";
            else if Probf le 0.1 then Star="*";
            else Star="";

      EditedValue=cats(put(FValue,comma16.2),Star);
      if M="WORK.OVERALLSIGMODEL3" then output OSM1;
            else if M="WORK.OVERALLSIGMODEL4" then output OSM2;
            else if M="WORK.OVERALLSIGMODEL5" then output OSM3;
      keep Label1 EditedValue;
run;


data OverallSig;
      merge OSM1 OSM2 OSM3;
      by Label1;
run;


data AllStatRows(rename=(model=EditedResults));
      set NumofObs AdjRsq OverallSig;
```

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```
       rename Label1=Regressors;
            length Regressors $20;
run;
data FinalTable (rename=(EditedResults=EffectValue));
       length Regressors $21;
       set CompleteTable AllStatRows;
run;
ods excel file="/home/u60152426/MySAS/FullResults1.xlsx";
proc print data=FinalTable noobs;
run;
ods excel close;
```